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2019 Edition [Volume 6, Part 6]

EDITED BY A.E. GREENING

AND C. P. J. EVANS

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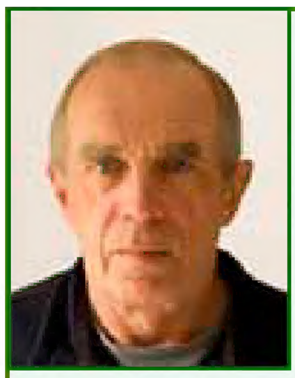
Editorial



Welcome to this edition of the *Ptertidologist*. It is the last edition of Volume 6. I started editing with the first edition of Volume 5 which makes it the 12th edition that I have been involved with. In the last 12 years the magazine has slowly changed it's layout; however it has a long way to go before I will be happy with it's look.

My predecessor, James Merryweather, produced 6 editions, from 2002 to 2007, and a further 4 editions from 1994 to 1997 making a total of 10. This was equalled by Martin Rickard who also produced 10 editions from 1984 to 1993. The missing years were filled by Barry Thomas who produced 4 editions from 1998 to 2001. That makes my 12 editions a record!

In this edition there was plenty of copy, eventually, hence the magazine's large size. Yet again it has run to 100 pages plus cover, which seems to be the limit because of postal costs. I have kept a very small number of articles back for the next edition but more contributions will,of course, be needed.

Again, we have a varied collection of articles, from the use of a computer programme that promotes interest about ferns in Ecuador, to ferns that survive a Swedish winter. Some new members might be wondering about the two articles published in memory of Tim Pyner. He was an extremely active member of the BPS with an enormous breadth of fern knowledge. The two articles were written for *The Plantsman* and reproduced here by kind permission of the editor as a tribute to Tim. Please note that there have been a lot of name changes amongst the blechnums that Tim wrote about several years ago. (https://ebps.org.uk/ferns/identification/blechnaceae-name-changes/)

Cultivars feature throughout this edition. Several members of the Cultivar Group have submitted articles. Ian Unsworth has written two article about *Athyrium filix-femina* cultivars, namely 'Kalothrix' and 'Plumosum Druery'. Julian Reed has written about 'Acrocladen' and two Polypodium cultivars, one of which is a new discovery (Page 505). Gert-Jan van der Kolk has written about 'Clarrissima' and growing it from apospory - if you are not sure what that entails please turn to page 473.

Yvonne Golding has brought together her wealth of knowledge about growing ferns in limited spaces on page 492. If you have ever seen her fern collection you will know that she is an expert in this matter. The front cover picture comes from Rolf Thiemann and he writes about an old hybrid that he has recently created artificially on page 440.

Thanks to my co-editor, Chris Evans, who has worked hard checking the articles, and my proof readers Roger Amos and Brian Ottway. If you have any contributions for next year please send them to Chris so that he can deal with them.

Enjoy your magazine.

Alec Greening

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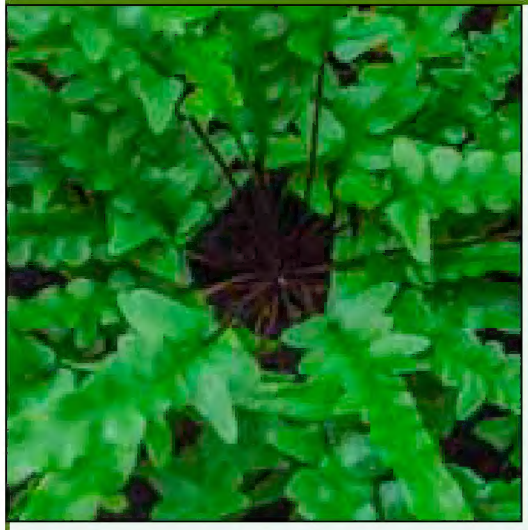


Front cover: (above)
Asplenium rhizophyllum x *tutwilerae.*

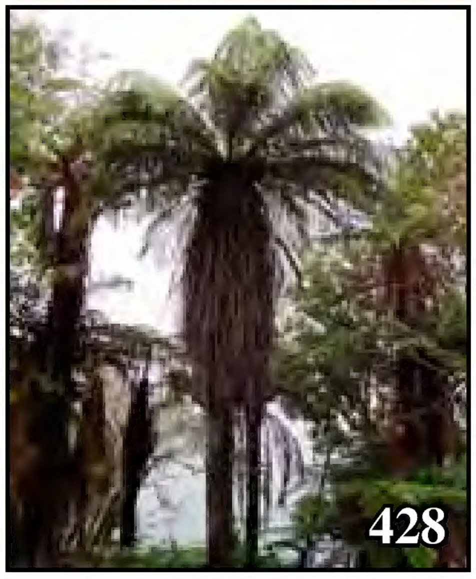
Photo: Rolf Thiemann

Back cover:(right)
Based on this image of
Blechnum procerum

Photo: Sylvia Martinelli

Notes for contributors
Ideally I would like contributions by e-mail or on disc or USB stick (which will be returned), with high resolution images.If this is not possible I will not rule out typed or hand-written copy. In general please follow the style of material in this issue.

Preview



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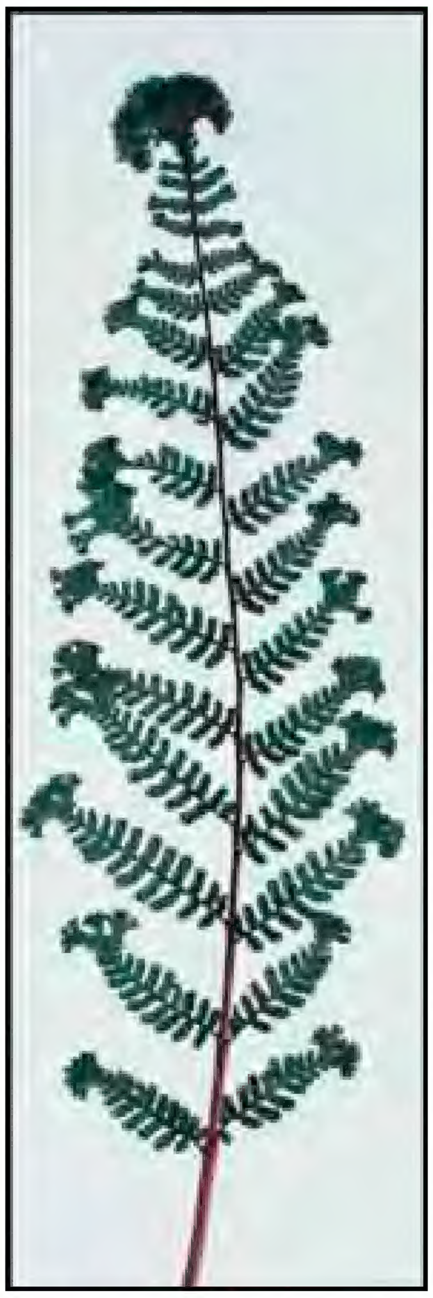

Athyrium X ‘Angelika Teipel’
(Photo: Rolf Thiemann)

Nature-Print made by Pia Östlund
(Photo: Adrian Dyer)

Unless stated otherwise, photographs were supplied by the author of the articles in which they appear

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Garden Design with Ferns à la Philadelphia 2018

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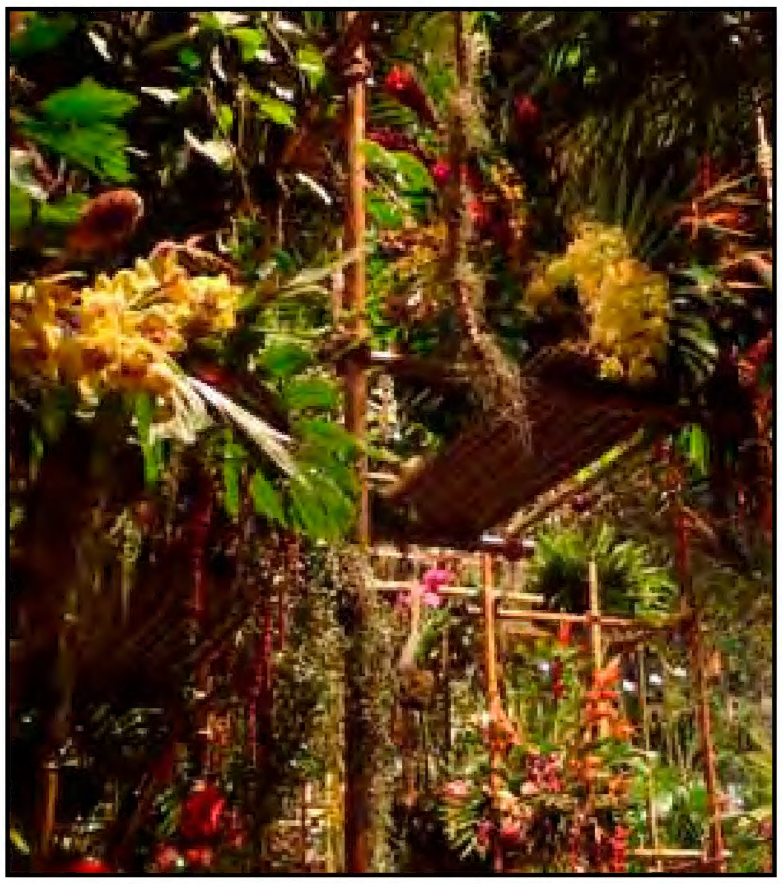

Fig. 1. The rain forest canopy entry that was draped with assorted showy plants and even enriched with the twitter of birds

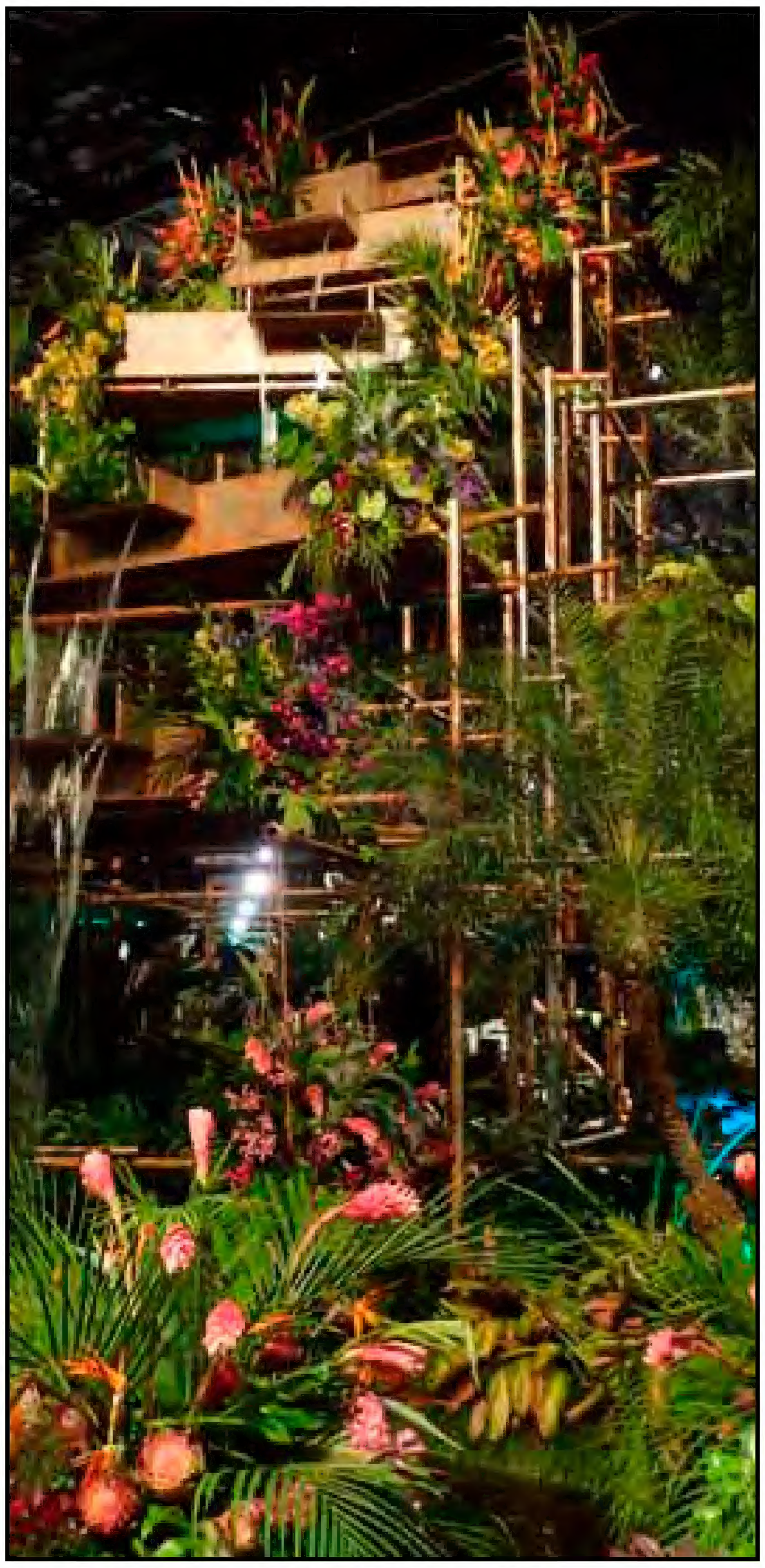

Fig. 2. The swirling waterfall with an extensive assortment of ferns in various displays despite the time of year

The theme for this year's AGM was Garden Design with Ferns but coincidentally and delightfully it was beautifully exemplified as well in Robertson's Flowers and Events Best of Show Award Garden at the 2018 Philadelphia Flower Show in Pennsylvania.

My youngest daughter, Tamra lives on our east coast and has been after me for years to go back there and attend the Philadelphia Flower Show, deservedly the best flower show in the US. I couldn't have picked a better year to say "yes". Their theme was "Wonders of Water" and we entered under a huge multi layered rain forest canopy draped with assorted showy plants and even enriched with the twitter of birds. (photo 1.) We were greeted by a swirling waterfall (photo 2.) and in spite of its being early March an extensive assortment of ferns in various displays. I was both amused and impressed for example by the imaginative use of brown fertile fronds staged as upright accents in a daffodil inspired garden. (photo 3.).

Nothing however compared to Robertson's elegant award winner an "Enchanted Woodland Wedding" which was enriched and dominated by a beautiful collection of ferns. Their designer, Emanuella Williamson was inspired by visits to temperate rain forests in Alaska and Washington State's Olympic National Park and she creatively and very successfully carried this woodland essence into their design.

Physically the display was set in a 48' by 42' space. The featured ceremony area was given special visual warmth with a 28' long 10' tall living wall containing over 600 plants (especially ferns). The traditional ceremonial

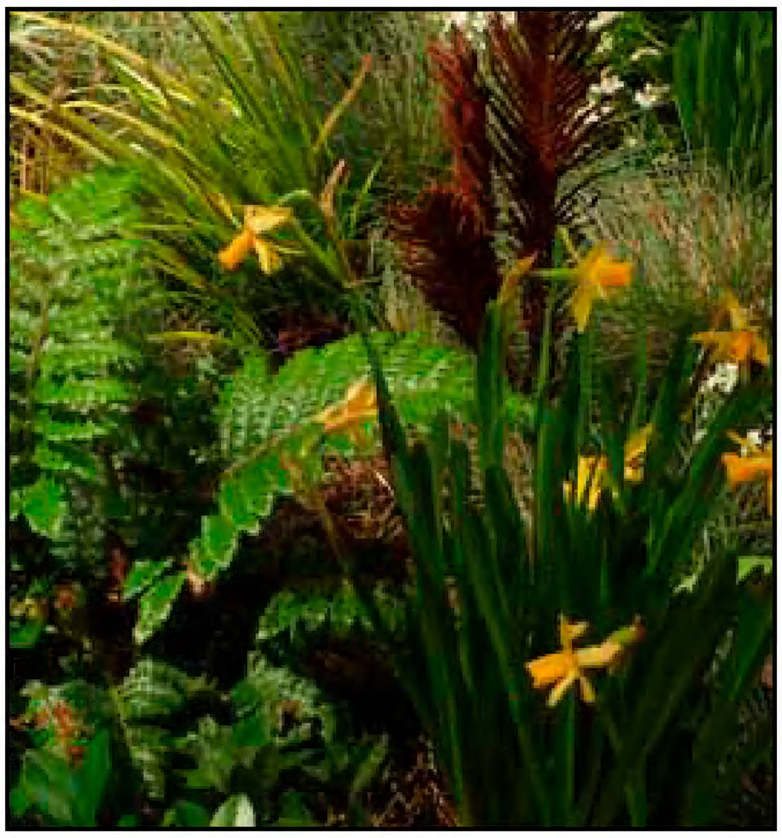

Fig. 3. Fertile fronds used to great effect as uprights in a daffodil inspired garden

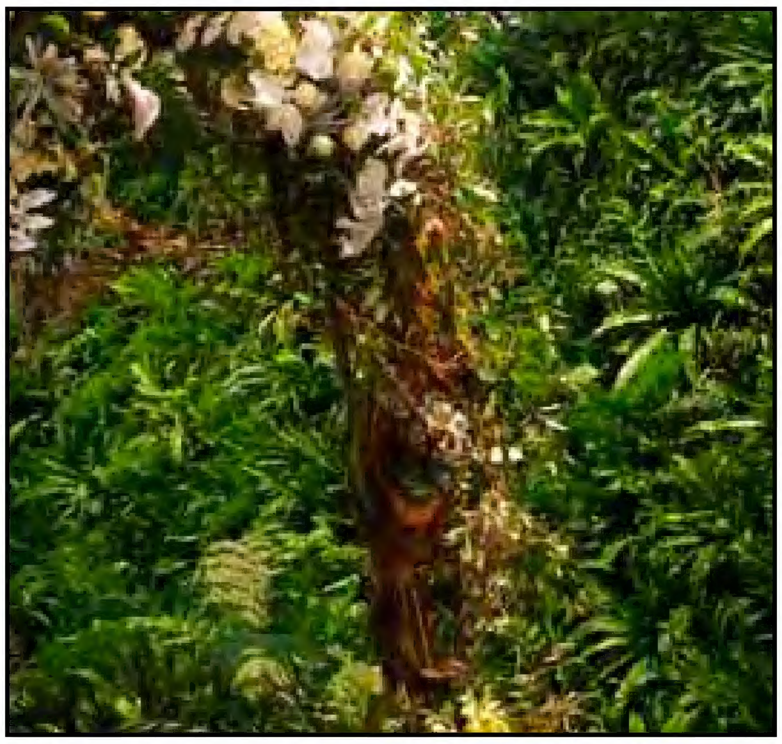

Fig. 4. The floral wedding arch composed of ferns and orchids with accents of hydrangeas, mosses and roses

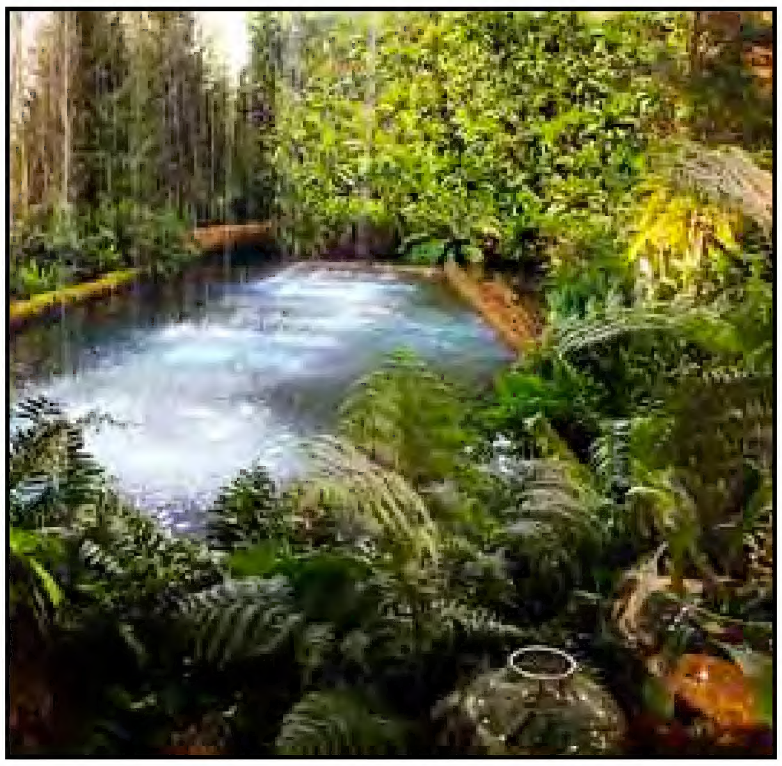

Fig. 5. The serene pool with special water lighting that gave a mystical feeling to the entire experience

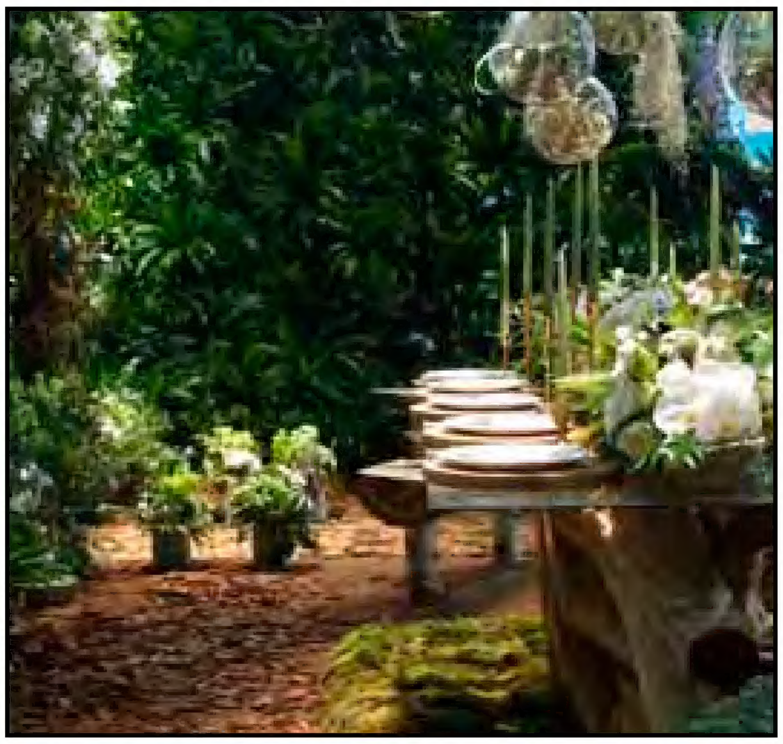

Fig. 6. The wedding table set with fern themed dinnerware and of course a grand floral arrangement

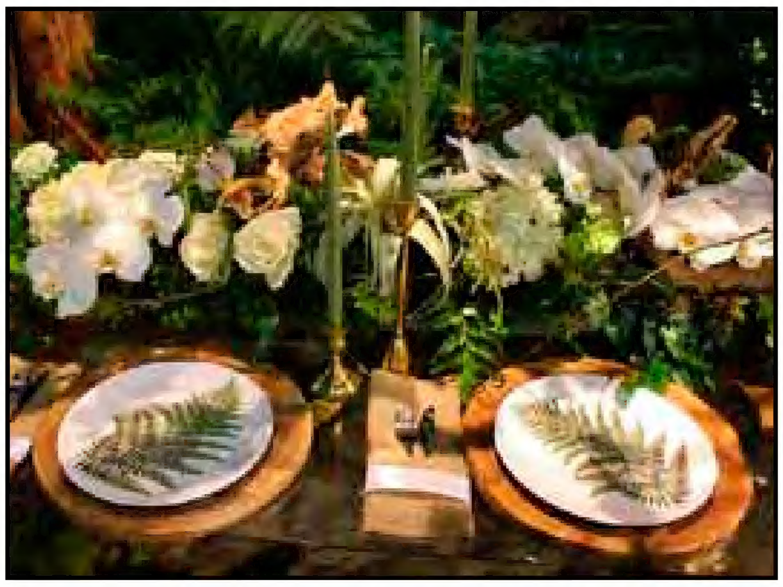

Fig. 7. Detail of the wedding table

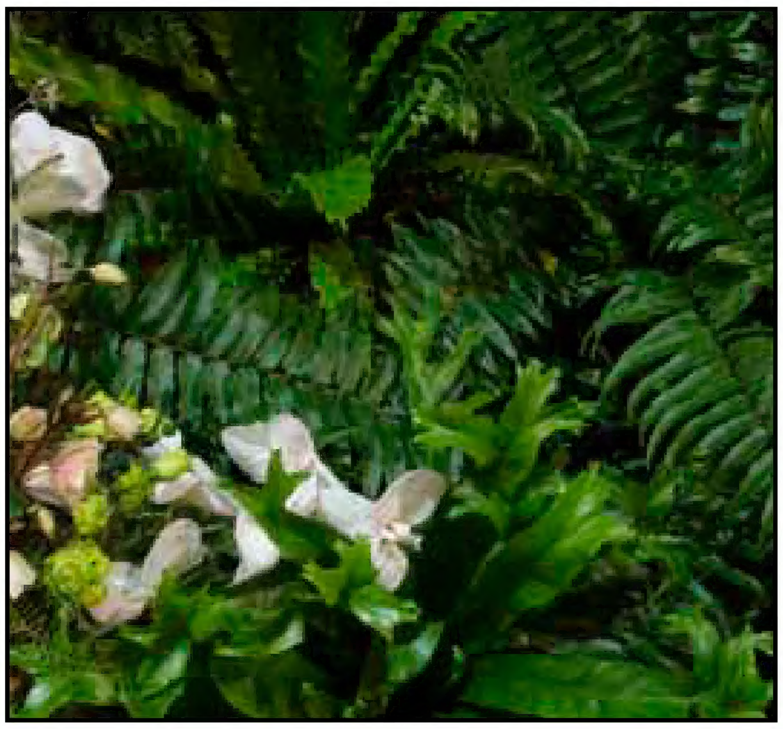

Fig. 8. Edging display

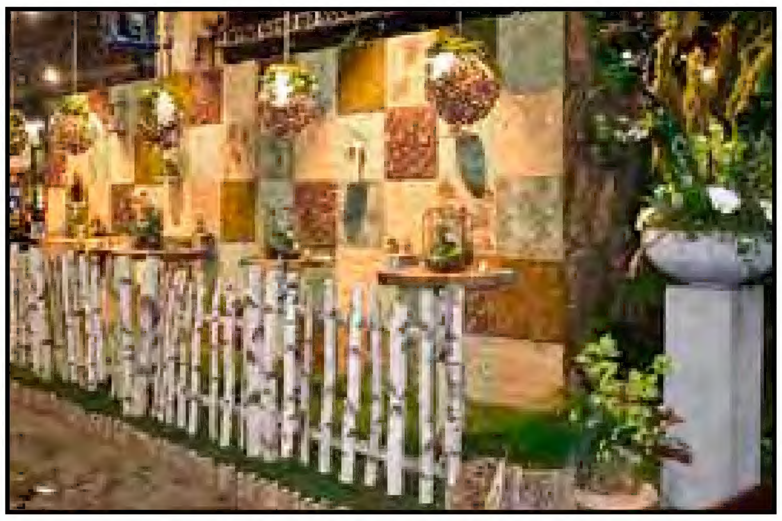

Fig. 9. The wedding cocktail area

proceedings displayed included an 18' long wedding aisle made of sliced birch disks which led to the sites' elaborate floral arch (photo 4.) composed of ferns and orchids with accents of hydrangeas, mosses and roses (replaced nightly). The magic of the setting spread forth to a serene 12' by 28' adjacent pool that was a major attraction with recycling rain and special water lighting that gave a mystical feeling to the entire experience. (photo 5.) To complete the tableau guests were to be seated at an impressive tree root table set with fern themed dinnerware and of course a grand floral arrangement. A custom created 9' chandelier with ornamental glass globes highlighted this feature. (photo 6.) Appropriately this entire display was given unity by a surrounding of fresh greenery and exquisitely detailed displays selected for texture and natural beauty.

Now for a few words about practicality.... visitor traffic by the backside of the display wall did of course need visual appeal as well so it became the wedding cocktail area with tables created from slices of a large tree trunk. The wall itself was "papered" with 70 2 by 2'squares covered with birch disks, fern printed fabric, burlap, green moss, brown branches and white raffia. (photo 8.) (It turned into a popular site for "selfies" by show patrons!)

And yes it did indeed need maintenance which took place every evening from 9:00-11:00 and the entire flower arrangement features were replaced midweek. Finally if, like me, you're wondering what happened to the plants there's a happy ending there as well since when the show was over, the plants were offered for sale and welcomed as souvenirs of fine garden design at the Philadelphia show. ❐

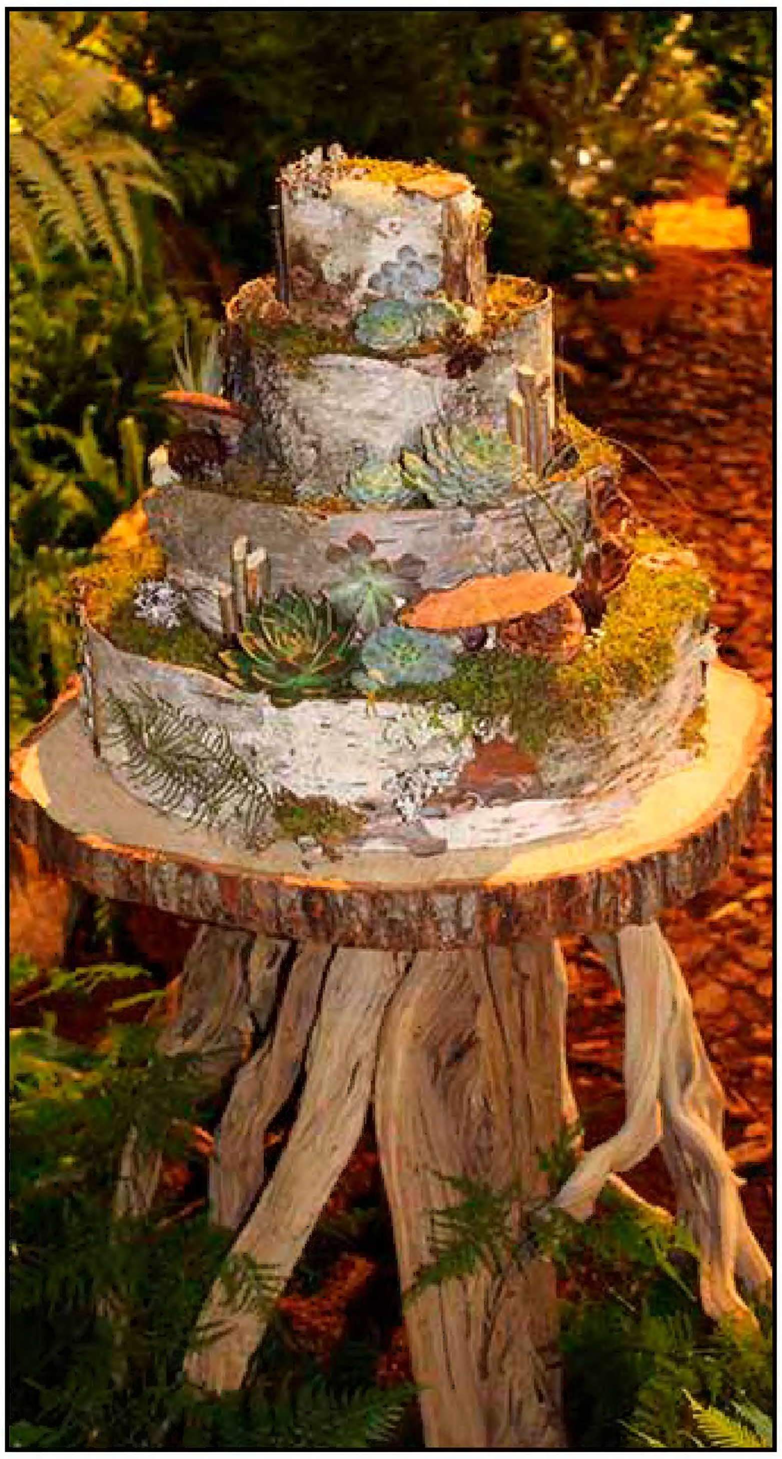

Fig. 10. The wedding cake

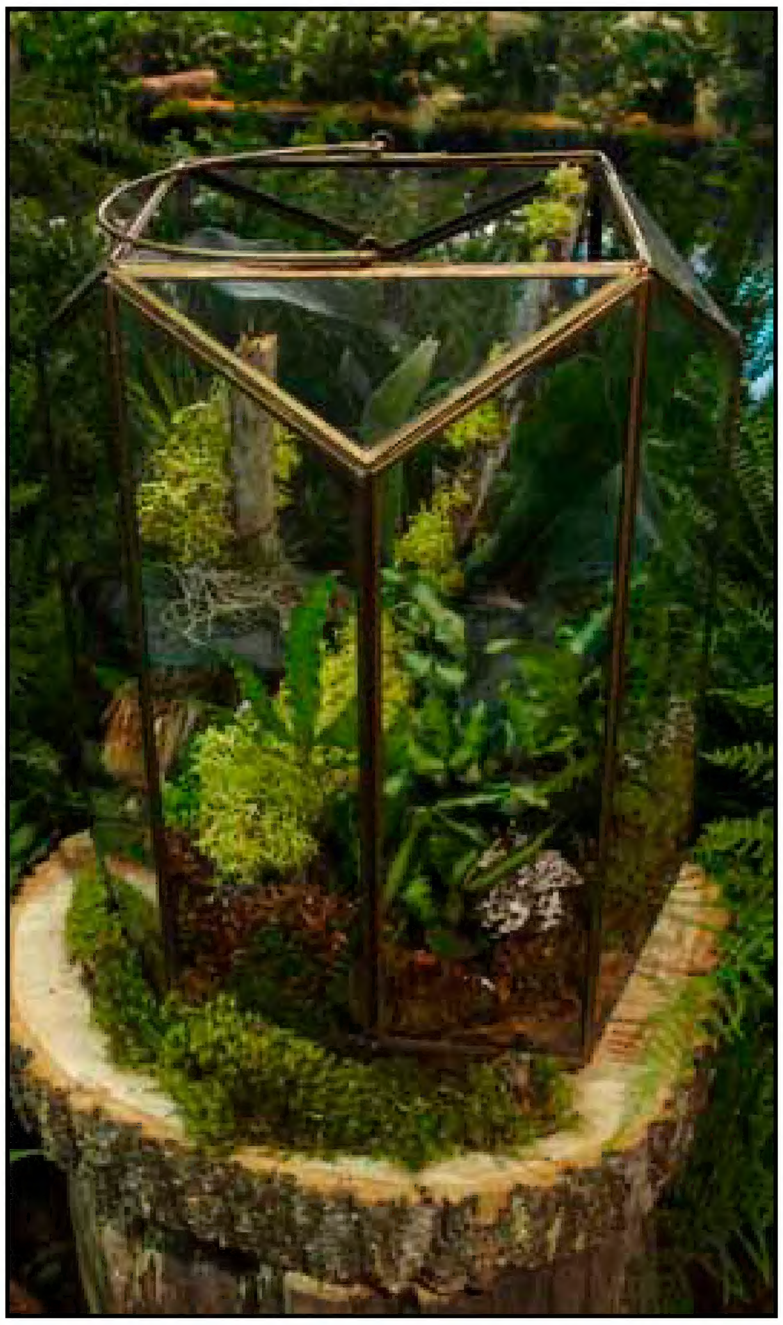

Fig. 11. A terrarrium with ferns

Elizabeth Harvey (1797 - 1872)

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Last year Michael Hayward wrote an article about Miss Wright, and her portfolios and albums on the Ferns of Cumberland (Hayward, 2017). Until Michael uncovered the existence of Miss Wright I had no idea she ever existed! Imagine my surprise when subsequently I stumbled across Elizabeth Harvey, who also produced fern portfolios and albums .

The story for me begins around 1970 when I decided to buy a rather tatty and uninteresting fern folder in a second hand bookshop. I can`t remember what I paid but it would have been very little. The portfolio was named on the front cover in neat hand writing *36 Species of British Ferns & Lycopodiums*, written on a doily-like label more likely to be associated with a jar of jam! There is no source name, so I thought it was simply a private collection. Only one specimen is dated: Green Spleenwort, *Asplenium viride*, near Oban, Argyle, 1848. All the other specimens are given scientific and common names together with the locality where collected. Sheets were collected together in three separate folders stitched together along the seam, arranged in no logical order that I can see. Each folder then has a narrow ribbon threaded along the seam and fixed at each end to the cover, holding the folders together in the manner of a book. The names of the species in each folder are hand written on the outside cover of that folder. Every specimen is named and the collection site is given on each sheet.

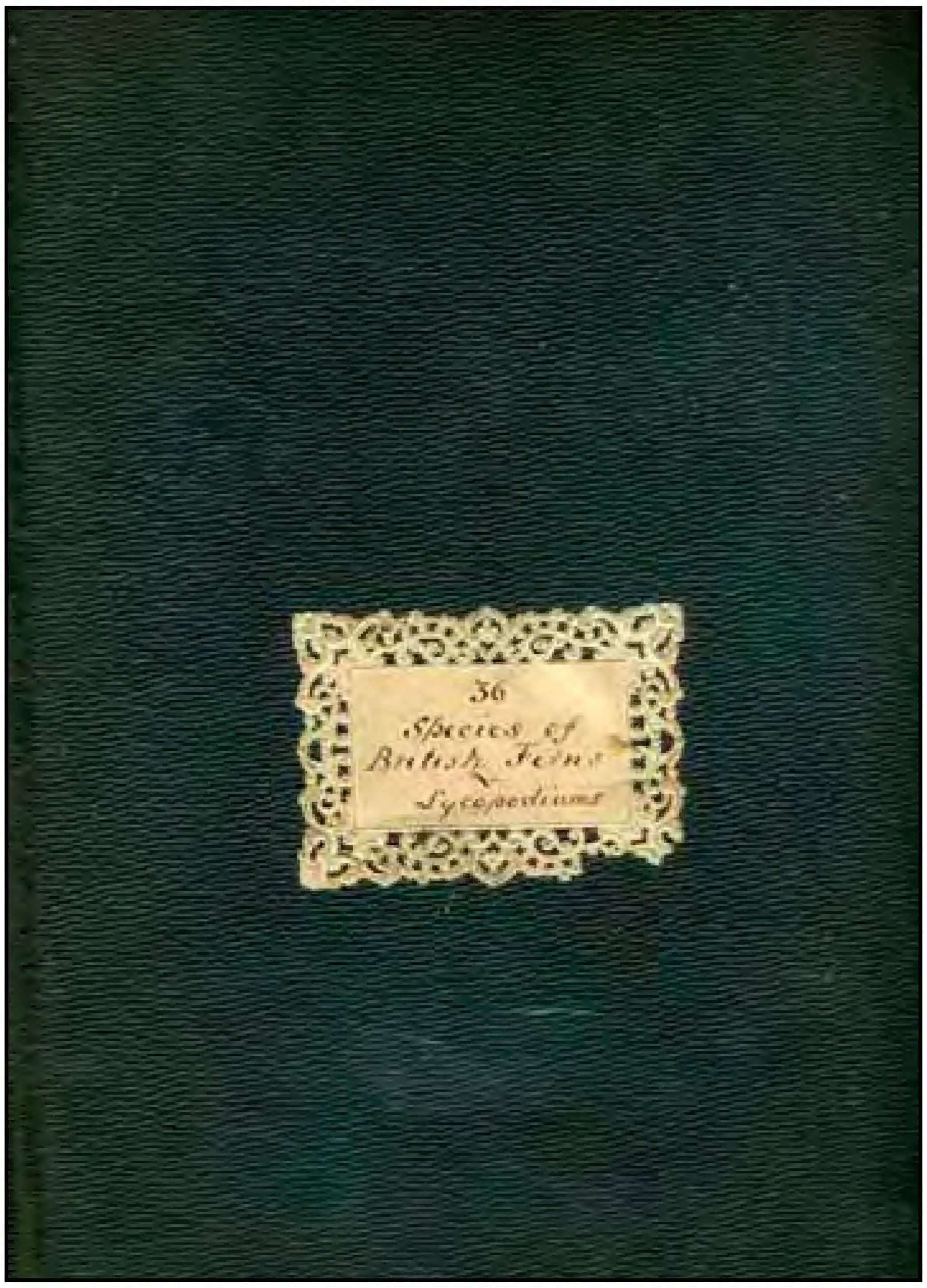
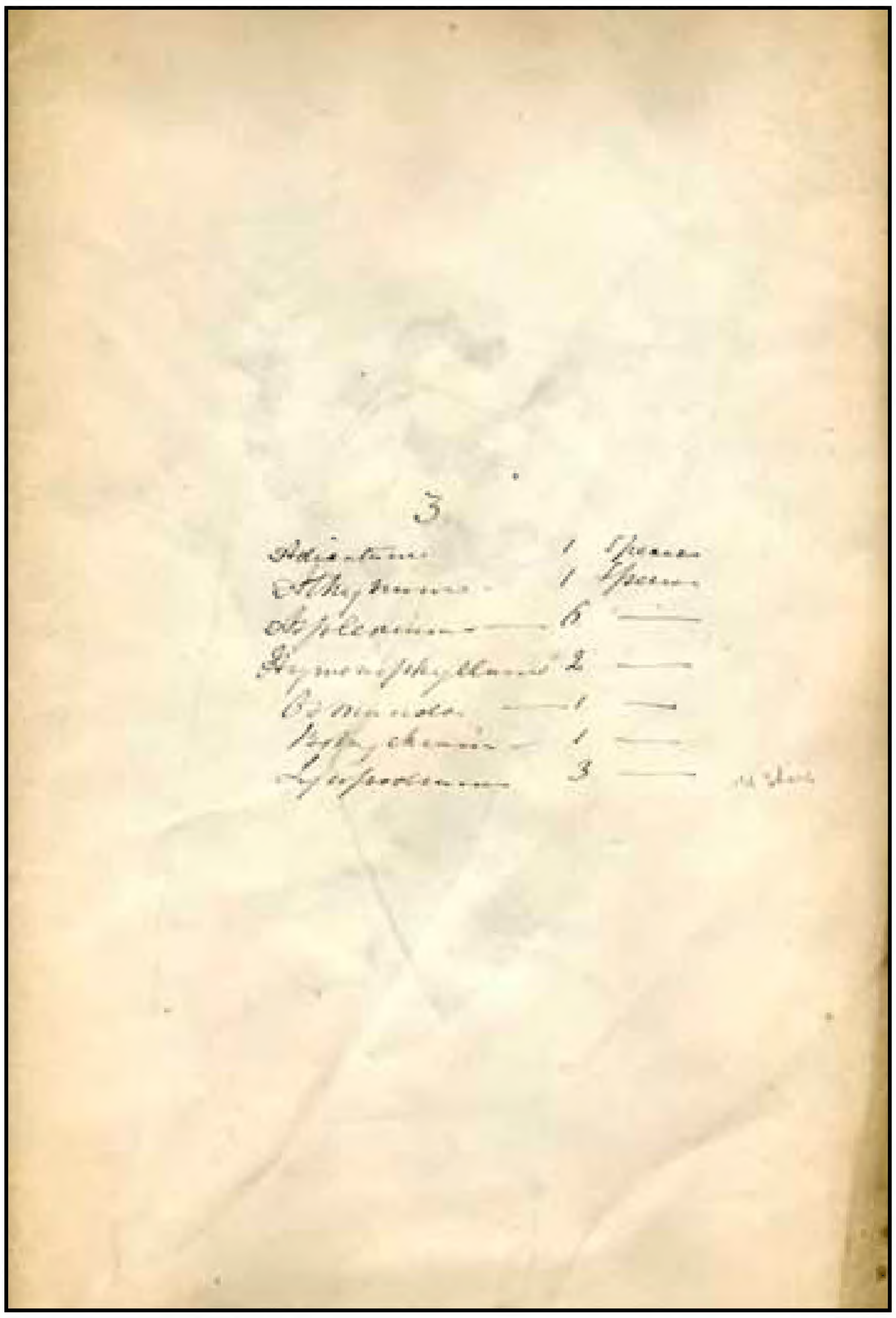


Fig. 1. Front cover of portfolio, c. 1848/49. 35 x 23 cm. In this figure and Fig.2. the bottom margin has been cut by 4.5 cm.

This folder foundered, forgotten, at the back of my book collection for decades, until I bought another rather more interesting bound album almost 50 years later. The principal attraction of this item was the printed title page dated 1850, See Fig. 3.



3
Adiantum 1 Species
Athyrium 1 Species
Asplenium —— 6 ——
Hymenophyllum 2 ——
Osmunda —— 1 ——
Botrychium — 1 ——
Lycopodium 3 ——

Fig. 2. Sample front cover of one folio with a full genus list.

At the base of the title page a stick-on label says ‘Ex. Herb. E. Harvey’. Once I took possession of the book I quickly realised that it had been prepared by the same hand as my earlier acquisition. The title on the outside front cover is also handwritten, also in something resembling a jam-jar label as *36 British Ferns and Lycopodiums*. The handwriting in both is identical. Inside the contents are listed in the same style, on a single sheet before the specimens. Most specimens are dated to 1850 but a few are 1849.

Elizabeth Harvey (1797 - 1872)

Miss Harvey probably grew up at The Oaks, in Deal, Kent. At some stage she moved to Edinburgh but returned to The Oaks in later life. While still quite young she contributed records to several local floras. *A floral guide to East Kent*, (Cowell,1839) contains many of her records, mainly from the area around Deal. She contributed to the Flora, as did her mother Lady Harvey. The only fern record mentioned is for *Ophioglossum vulgatum* from the marshes at Hacklinge. She also subscribed to *Collections towards forming a Botany of Dover*, Anon (1847) however, this was not published. Miss Harvey`s father was Admiral Sir John Harvey, her uncle was Admiral Sir Edward Harvey and her great uncle was Vice-Admiral Sir Henry Harvey. Elizabeth`s grandfather was Captain John Harvey - no doubt he would have been an Admiral too but he was killed in action. There is a public house in Dover called the Admiral Harvey. I don`t know after which one!

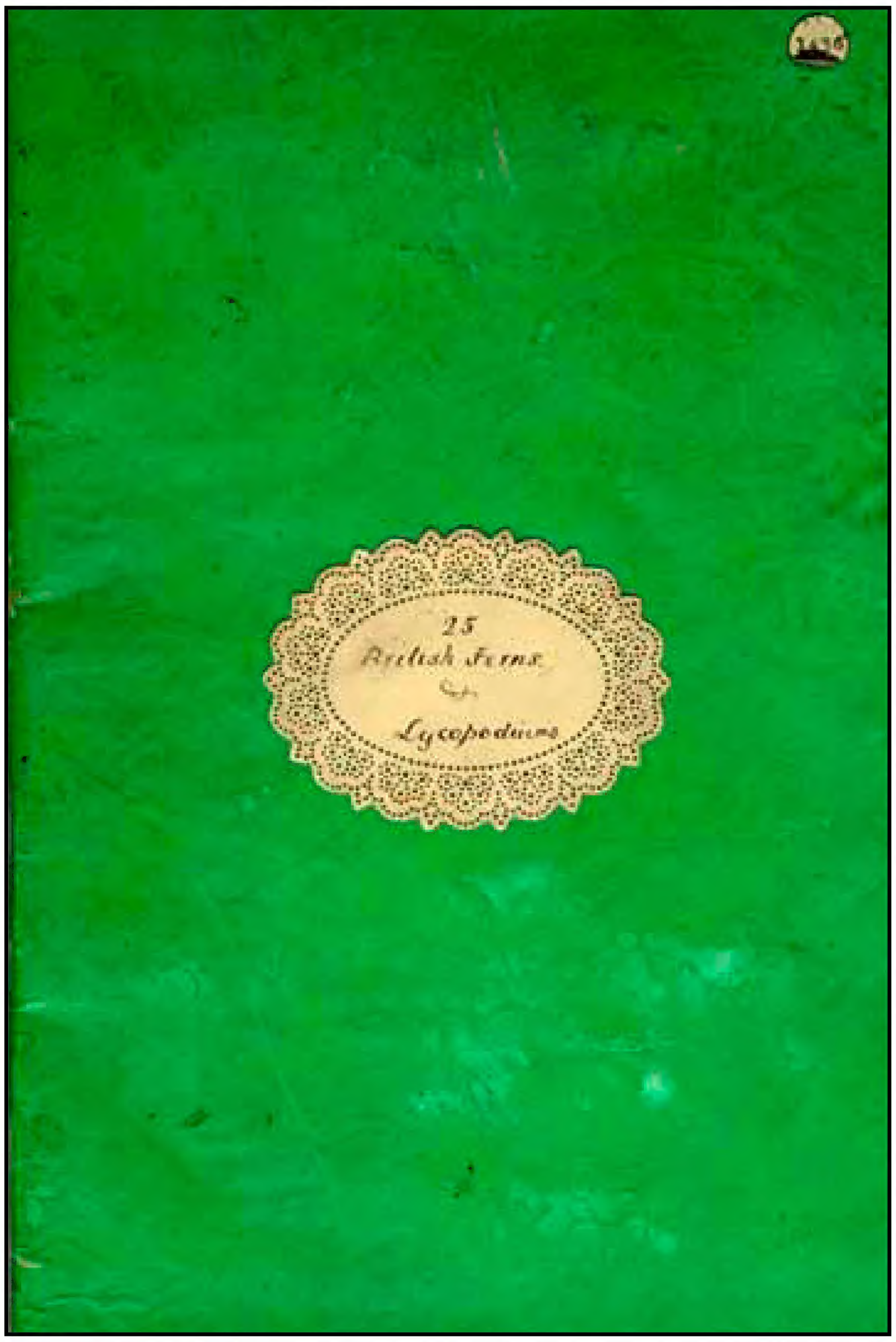
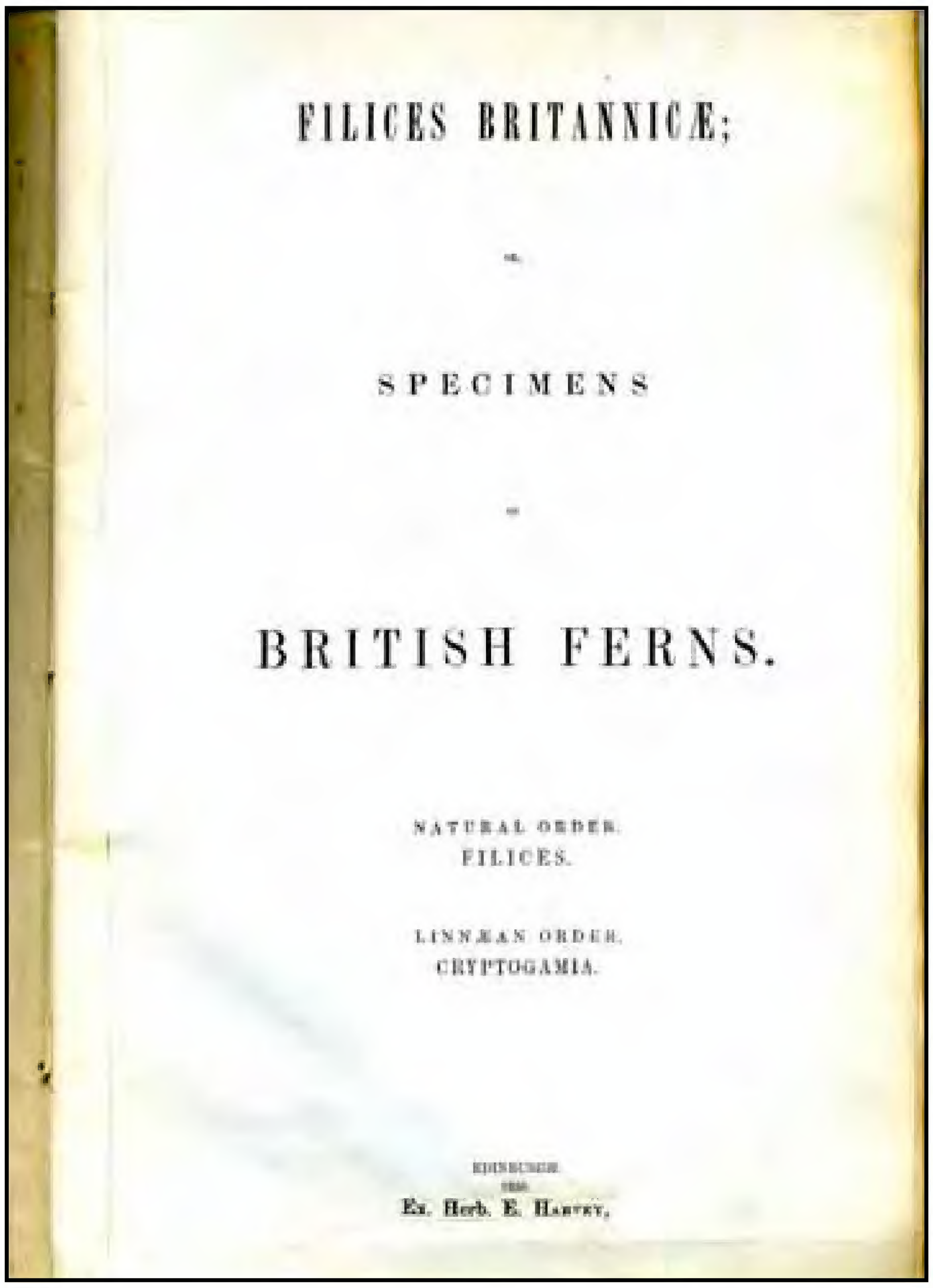


Fig. 3 Elizabeth Harvey album cover, 1850. Title *25 British ferns and Lycopodiums*. 33.5 x 20.5 cm.

With such a distinguished family it is not surprising that Elizabeth probably led something of a life of leisure and could pursue her interest in botany. It is not certain whether her albums and portfolios were produced in any number. I have only seen two, one of each kind. It is not known if they were sold, or produced as a hobby. Unlike Miss Wright, Miss Harvey surely had no need to produce portfolios and albums as a living. She was a member of the Botanical Societies of London and Edinburgh. She incurred the wrath, or at least displeasure, of Hewett Cottrell Watson , the author of many nineteenth century books on plant distribution in the British Isles. Apparently she distributed herbarium sheets with more than one specimen to a sheet, causing some confusion with labelling. (Watson, 1847, and Allen, 1981).



FILICES BRITANNICÆ;

SPECIMENS

BRITISH FERNS.

NATURAL ORDER.
FILICES.

LINNÆAN ORDER.
CRYPTOGAMIA.

Ex. Herb. E. Harvey.

Fig.4. Elizabeth Harvey album, title page, *Filices Britannicae*, British Ferns.

Curiously the two items here described only included ferns, although her plant collecting was much more general. The ferns were collected from all over England, Scotland and Wales.

The portfolio seems to be the earlier item. One record is dated 1848 as mentioned above, the album is dated 1850 on the title page. Quite possibly both were prepared in 1850. At around the same time Miss Wright of Kendal was producing fern albums commercially (one portfolio is dated 1851 in her hand). See Hayward 2017. The exact date of her albums is not known but one portfolio is dated 1851 in Miss Wright`s hand.

The collections by both ladies were rather unprofessional in their presentation; in fact they were fairly scrappy, and I suspect not expected to last long. Ppossibly this is why they are so rare today. Miss Wright`s portfolios are simply loose sheets, usually about 42.5 x 27.5 cm, as in a herbarium. Miss Harvey does make some attempt at binding but her sheets are much smaller, 20x23 or 33 35cm. These ladies' albums and portfolios appear to be amongst the earliest tourist-style herbaria offered commercially on British ferns. Gardiner produced albums on Scottish and/or British ferns around 1848 and 1850, which were also rather flimsy.

Elizabeth Harvey (1797 - 1872)

Flintoft`s albums on Lake District ferns, slightly later, were well bound and robust. All specimens in Miss Harvey`s albums are mounted on the recto sheet, apparently never on the verso. Sadly Miss Harvey spelt ‘filix’ as ‘felix’ in her 1850 album, but as ‘filix’ in the portfolio! In the same album there is a discrepancy regarding number of species included. The cover states 25 species. The inside list states 26!

Both ladies used small stickers in the centre of their front cover carrying the title, I have seen no other items using such stickers. Miss Harvey`s were small hand written doilies, Miss Wright’s were less fussy and printed. Were they friends or was one copying the other or was it pure coincidence?

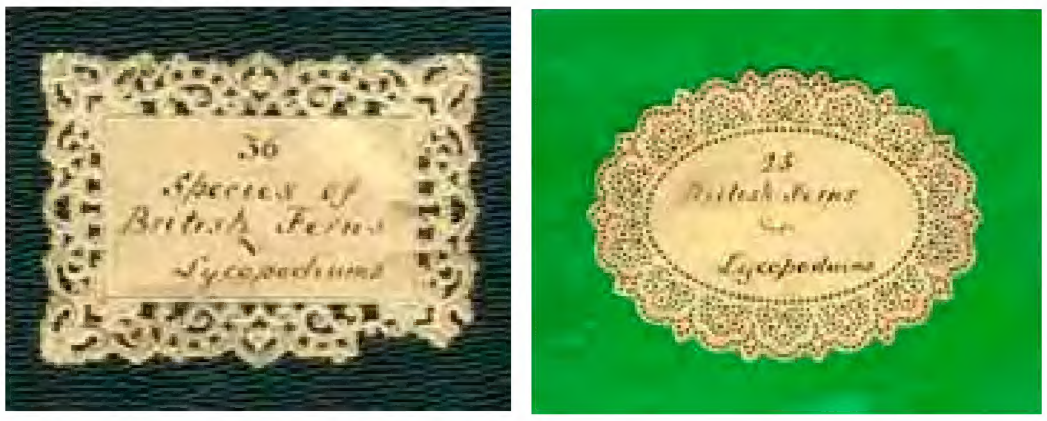


Fig.5. Doilies on front covers of Elizabeth Harvey items. Left. Earlier portfolio c. 1848/49. Right. Later album. 1850.

Miss Wright`s labels are custom prepared, not looking quite so amateurish.

Unlike Miss Wright, Elizabeth Harvey`s collections were not regionalised. Specimens in the portfolio were from much of mainland Britain, with most coming from south west Wales, south east England and Scotland. Only 7 came from the Lake District. In contrast the 1850 album contained 21 specimens from the Lake District - the remainder were from Scotland. Perhaps the portfolio was prepared during her period of moving from the SE of England to Scotland.

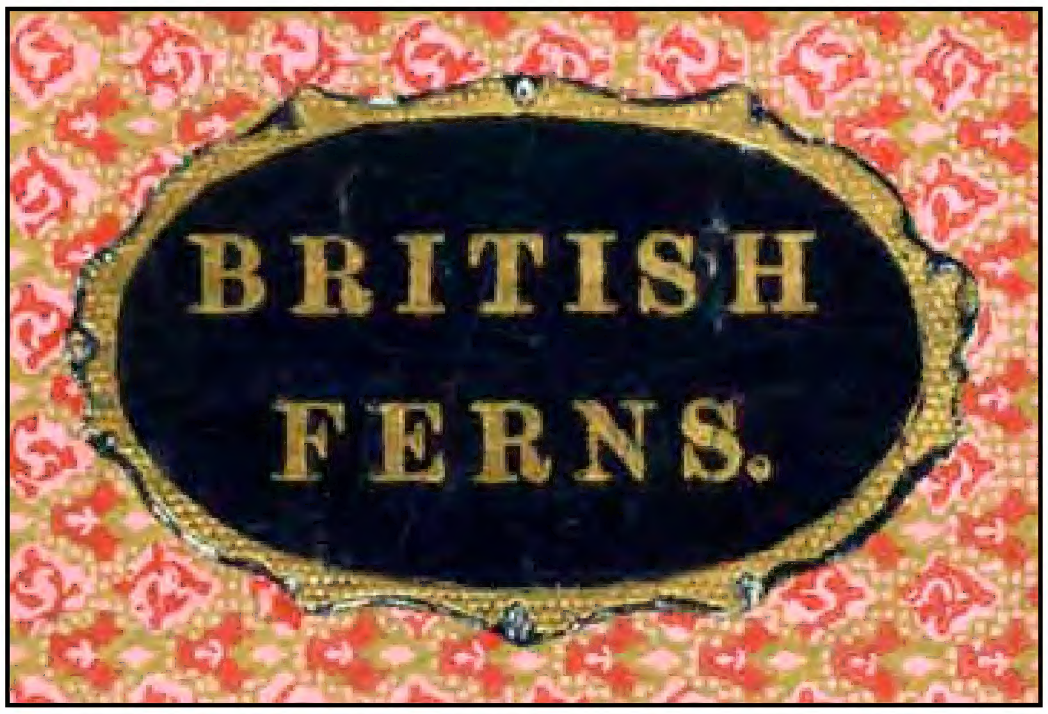


Fig. 6 . Stick-on doily-type label on front of a Miss Wright portfolio, c. 1851.

It is curious that the only items seen are exclusively on ferns. Her more general botanical collections are also represented in some institutional herbaria, according to Kent and Allen,(1984). Specimens collected by her are in the following herbaria: Bolton, Edinburgh, Manchester, National Museum of Wales and Warwick.

Of these Edinburgh is on-line and shows quite a few collections by E. Harvey; many are algae but a few are flowering plants, notably orchids, but sadly there appear to be no ferns. The flowering plant specimens do look to be labelled in Miss Harvey`s hand. The algae perhaps not. Further confirmation that the flowering plant specimens are from the same E.Harvey as the fern portfolio and album is the sticker ‘Ex. Herb. E.Harvey’ used occasionally. The latest dated specimen in Edinburgh is 1847. Some specimens are attributed to ‘Harvey’, this might be Elizabeth`s mother, Lady Harvey.

Needless to say I would be very interested to hear of any other fern collections put together by Miss Harvey.

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Athyrium X “Angelika Teipel”, a Fern Gem for the Garden

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Two years ago I wrote about a new hybrid when I crossed *Athyrium filix-femina* ‘Cristatum’ and *Athyrium japonicum* ‘Pictum’ (See Pteridologist 2016 p. 198 : The Best Way to Create Hybrids). I mentioned that I was going to observe the plant over time to evaluate its characteristics in order to decide whether it would be different enough from other cultivars to be worthy of a cultivar name. Time has shown that there is a clearer view that the hybrid is more different from others, specially the cultivar ‘Ocean´s Fury’ (Fig.1).

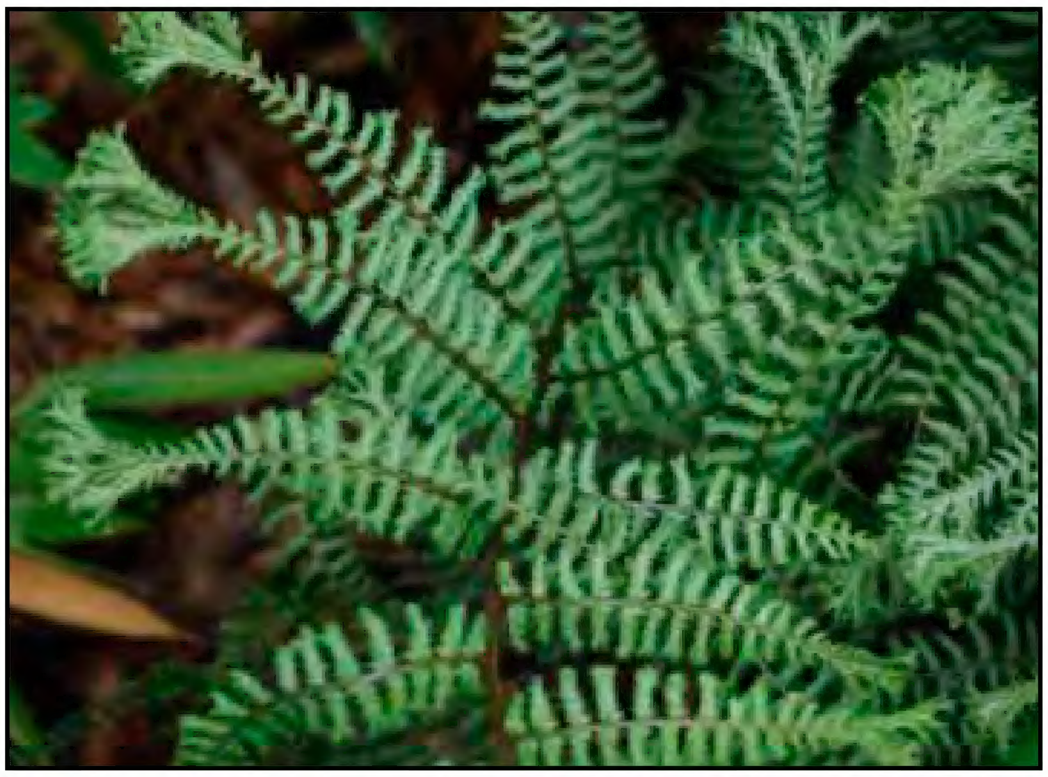

Fig.1. *Athyrium* X ‘Ocean’s Fury’

Both cultivars share the same degree of cristatum development and the weak sign of percristate pinnules (See Fig. 7). But in other characteristics they differ. Whereas ‘Ocean´s Fury’ has wide arching large fronds, the plant which arose in our garden is growing more or less strongly upright and reaches only a normal size of 40 to 50 cm (16 – 20") in our garden (See Figs. 1 & 2).

The largest frond I observed was 69 cm (27") in length. Two types of fronds occur, smaller and slender ones which are the most upright and, more rarely, larger and broader fronds (See Figs. 3 & 4).

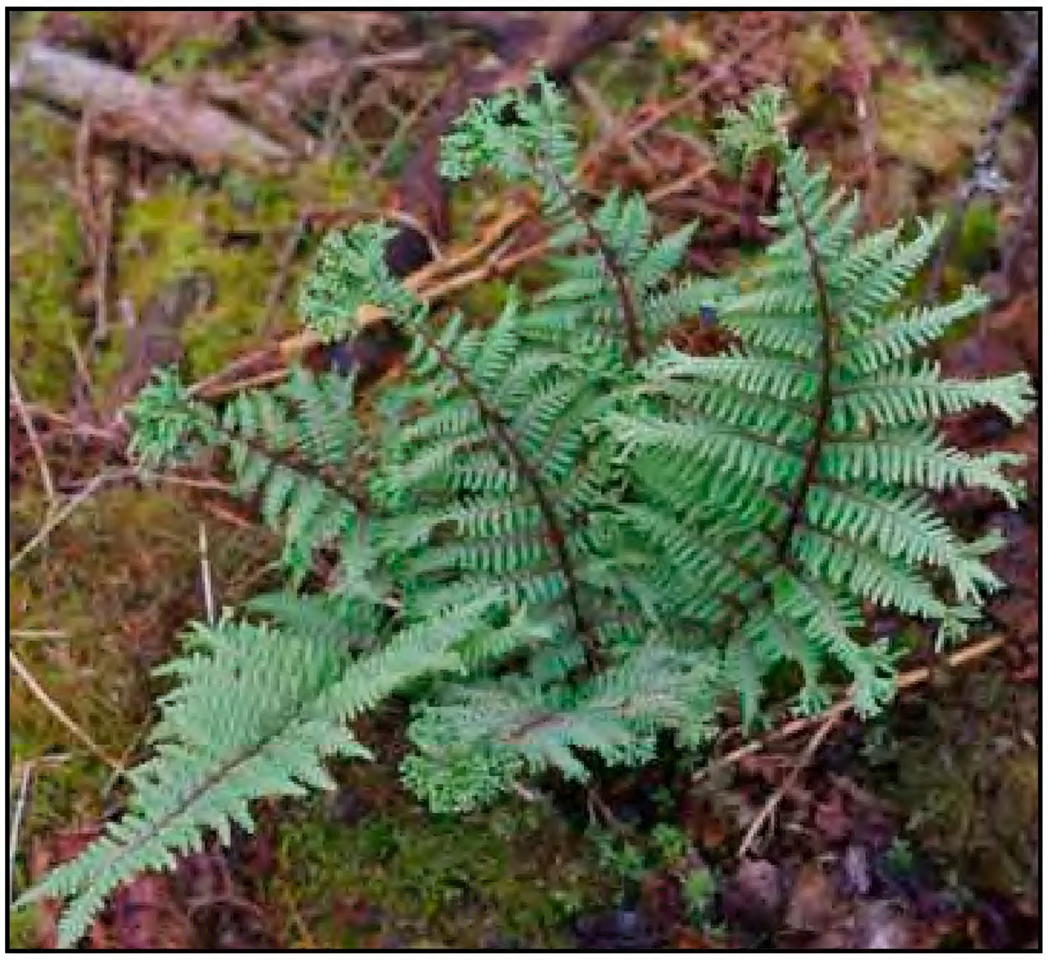

Fig. 2: *Athyrium* X ‘Angelika Teipel’

Also the fronds are not so “airy” but more regular and with closer standing pinnae and pinnules. The stipes and the rachis show a clear wine-red in opposition to the more brownish colour of ‘Ocean´s Fury’ (See Fig. 5) which is a good contrast to the golden lamina in autumn (See Fig. 6). Therefore it is easily to separate from the other cristate form of this hybrid combination.

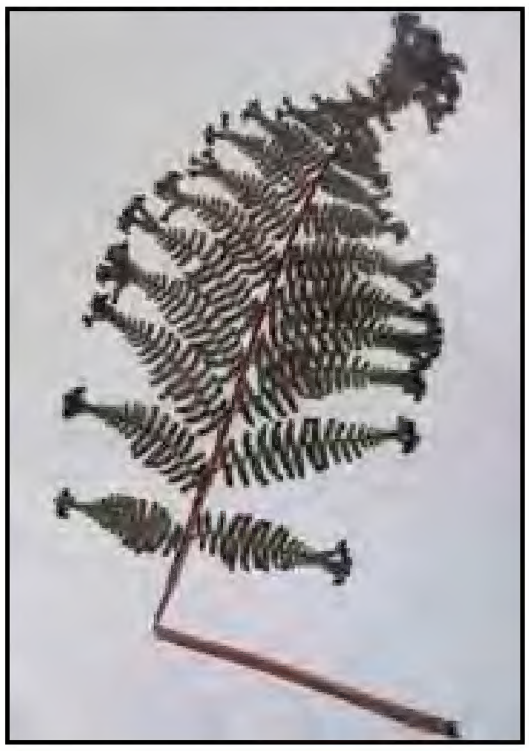

Fig. 3. The broad form of fronds. This frond is 48 cm in length

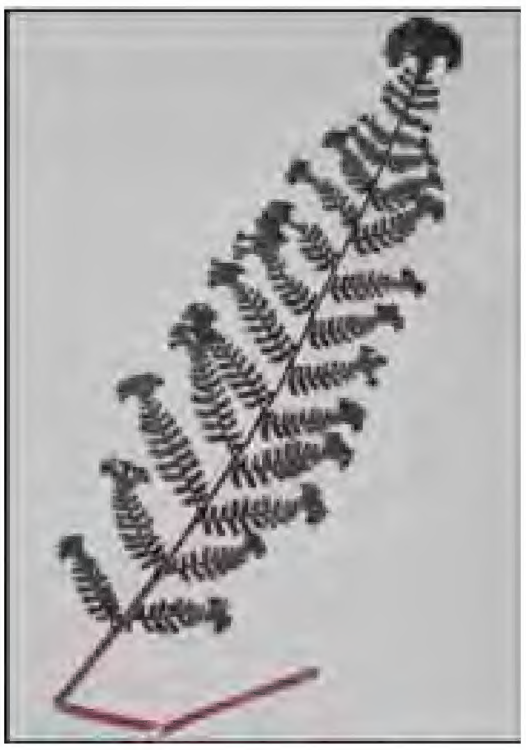

Fig. 4. The narrow form of fronds. This frond is 42 cm in length

I have given this hybrid the name ‘Angelika Teipel’ after my wife´s maiden name.

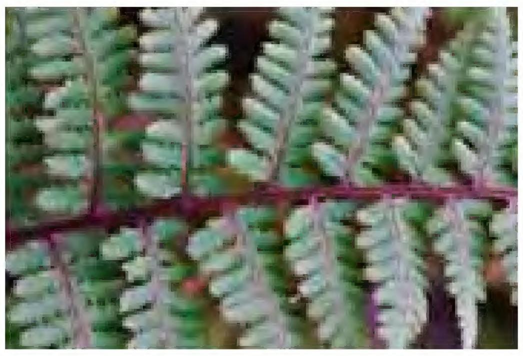

Fig. 5. The wine-red rachis and pinnae stems of ‘Angelika Teipel’

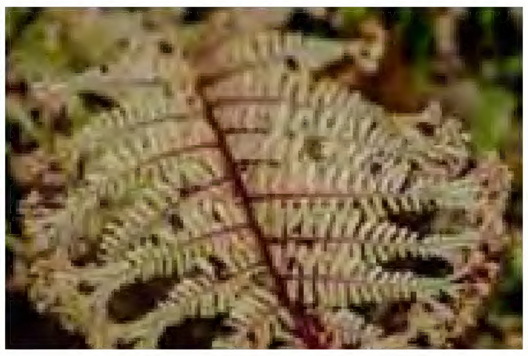

Fig. 6. Autumn colour of ‘Angelika Teipel’

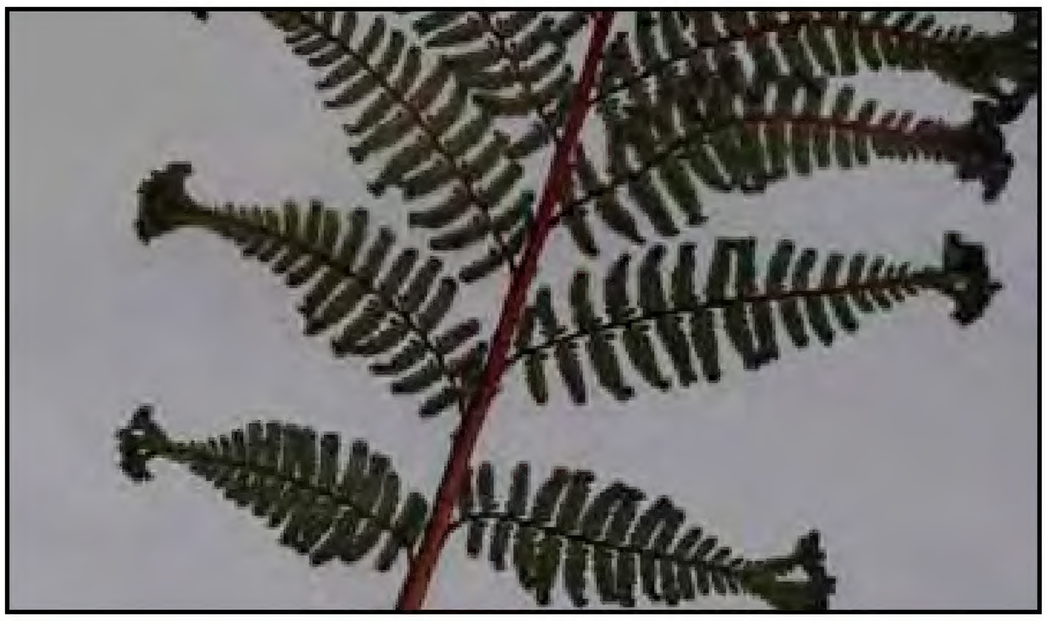

Fig. 7: Close-up which shows the sometimes occuring weak percristate pinnules

Acknowledgement
I wish to thank Alec Greening for preparing the text prior to publication.

Retracing my Footsteps

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During 1975, I became aware that some ferns were to be found on the mortar of walls in the most inhospitable places. This revelation was touched on in a short note that I published in the BPS Bulletin 1976, where I related how during a brief visit to the Birmingham Canal Navigations (BCN) with my two young sons in 1975, we discovered a plant of *Asplenium scolopendrium* in the mortar of a canal bridge close to Gas Street basin. This was something of a revelation to me because up till then my experience of ferns was either in the countryside or in the garden. Later that summer on family picnic beside the Stratford upon Avon canal at Rowington, I was surprised by the quantity of Aspleniums to be found on the bridges of this canal in deepest Warwickshire. I decided that it might be interesting to survey all the brickwork on the canal system in and around Birmingham to compare the differences that there may be between the urban, suburban and rural environments. The BCN consists of about 15 miles of canals that wend their way around the numerous factories and workshops that had earned Birmingham the title of the 'Workshop of the World', much of it dating from the late 18th century, so there was plenty of 'material' to examine.

As I was working at Aston University, which is close to the city centre, I was able to spend most lunch times walking the canals that ran close by. My first outing in April 1975 was to follow the canal from Gas Street basin to make a right turn onto the canal at Old Turn Junction and along the stretch of Farmers Bridge locks as far as Aston Junction where the Fazeley Canal branches off to the left from the Digbeth Branch just past Lancaster Road bridge, and to continue on along the Fazeley canal as far as Thimble Mill Lane bridge. (*any possibility of a map?)* This is a distance of some 4km, but the only ferns found along this section were *Dryopteris dilatata, Dryopteris filix-mas* and *Pteridium aquilinum*, all found along the canal towpath, with nothing on the walls or bridges. It appeared that *Asplenium adiantum-nigrum, Asplenium ruta-muraria, Asplenium scolopendrium* and *Asplenium trichomanes* were absent from the city centre apart from the solitary plant of *Asplenium scolopendrium* that I found in 1975.

A study of the local ordnance survey map revealed how the rather straight route of the canals provided a ready-made transect through the various areas of the city, from the most polluted industrial areas to the new green and pleasant developments in the suburbs. I realised that a suitable base-line from which to start my study would be to find what had been found in and around the city and its environs by previous botanists. Fortunately, I had to hand a copy of Bagnall's 'Flora of Warwickshire' 1891. Unfortunately, this was published long before the Ordnance Survey Grid System was devised. In order to present his records Bagnall divided the county according to major river valleys or areas. These were the rivers Tame, Blythe, Anker, Avon, Sow, Stour, Arrow and the Cherwell.

Another problem is that in the intervening years Birmingham has become Greater Birmingham by growing and incorporating numerous towns and villages in its immediate vicinity. So for industrial Birmingham of the 18th century, I was largely restricted to the River Tame records because this river passes through some of the most industrialised areas of the city. What I managed to glean from his list makes interesting reading; *Asplenium adiantum-nigrum, Asplenium trichomanes, Asplenium ceterach, Asplenium scolopendrium, Athyrium filix-femina, Polystichum setiferum*, all unreported from the Birmingham area. What is reported are *Asplenium ruta-muraria*, Aston Park wall! (Bagnall's exclamation mark not mine but it validates my surprise too) *Blechnum spicant*, in lanes about Aston Park, no dates given but Bagnall states that it was extinct in this area by 1890.

Pteridium aquilinum common and widespread, *Polystichum aculeatum*, Saltley! Birmingham (this time it's my exclamation mark) reported in *Ick, Anal., 1837*. *Dryopteris carthusiana*, Birmingham Heath, *Withering Ed. 5,* (NB. Birmingham heath was a very large tract of land that stretched from the western edges of industrial Birmingham to abut the great heathlands of South Staffordshire. During the 18th century, much of it disappeared under the industrialised villages of Smethwick, Oldbury and West Bromwich. ARB*)* Other ferns are mentioned but are restricted to the more rural areas of the River Tame.

Gas Street basin is the hub of the BCN and my next excursion was to examine the bridges along the canal that connected Birmingham with Wolverhampton and the Black Country towns and their myriad of factories and workshops. In June 1975, I walked the canal as far as Rabone Lane Bridge, roughly on the border of Birmingham and Smethwick. Along this section I found a similar situation. No Aspleniums but *Pteridium aquilinum, Dryopteris dilatata, Dryopteris filix-mas* and *Equisetum arvense*.

I must explain that the original canal was built by James Brindley. This is a narrow navigation which is also extremely tortuous as it winds backwards and forward in an attempt to serve as many industrial centres as possible. The first section between Birmingham and Wednesbury was opened in 1769 and the section to Wolverhampton was completed in 1772. In later years, Thomas Telford was employed to improve this link, which was proving totally inadequate for the amount of traffic that Brindley's navigation was attracting. Telford's solution was to build a 'main line' which

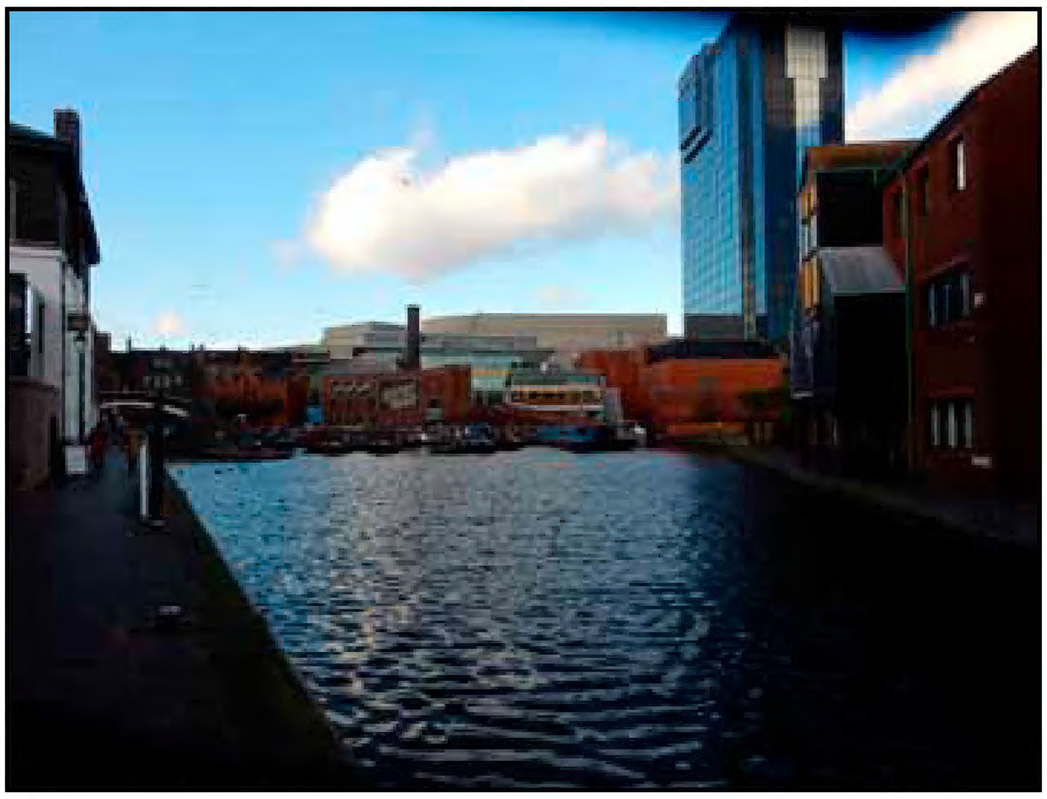

Fig. 1. Modern Birmingham looms over the early 19th Cent. workshops at Gas Street Basin

Retracing my Footsteps

is much straighter and wider than the Brindley navigation; this opened in about 1828 but more about this another time. My next survey in early July 1975, was to examine the Birmingham to Worcester canal from Gas Street. It runs in a south-westerly direction through Edgbaston and its large and verdant gardens of the privileged. There was some industry, the largest being Cadbury at Bourneville. At first there was little to be found on the walls and bridges but I found the towpath furnished with *Asplenium scolopendrium, Athyrium filix-femina, Dryopteris dilatata, Dryopteris filix-mas, Pteridium aquilinum* and *Equisetum arvense*. So that was the state of the Pteridophyte Flora on the BCN in 1975. Very disappointing, but I had noticed *Asplenium ruta-muraria, Asplenium scolopendrium* and *Asplenium trichomanes* on railway bridges in the Birmingham suburbs. Railway bridges were not part of this initial survey but it did cross my mind that atmospheric pollution might be playing a part in the distribution of mural ferns in Birmingham; however subsequent events were to spur me on to greater efforts.

To be continued…………..

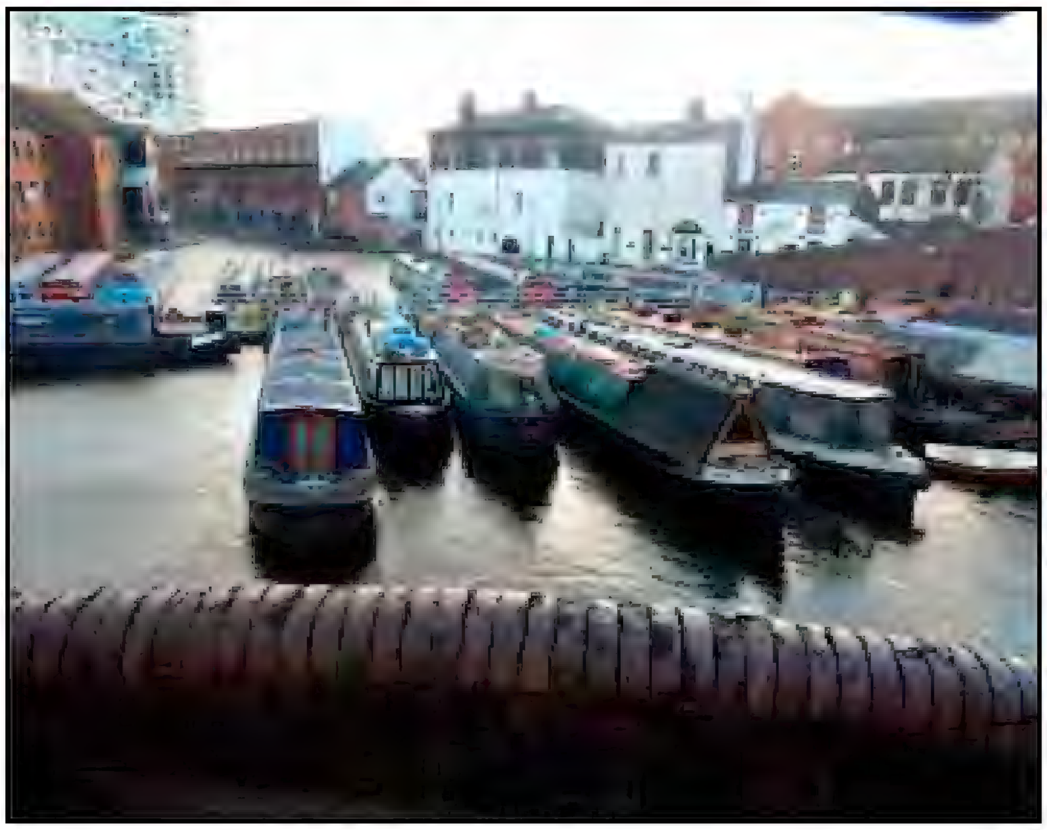

Fig. 2. Gas Street Basin with its array of boats both leisure and residential but no place for ferns?

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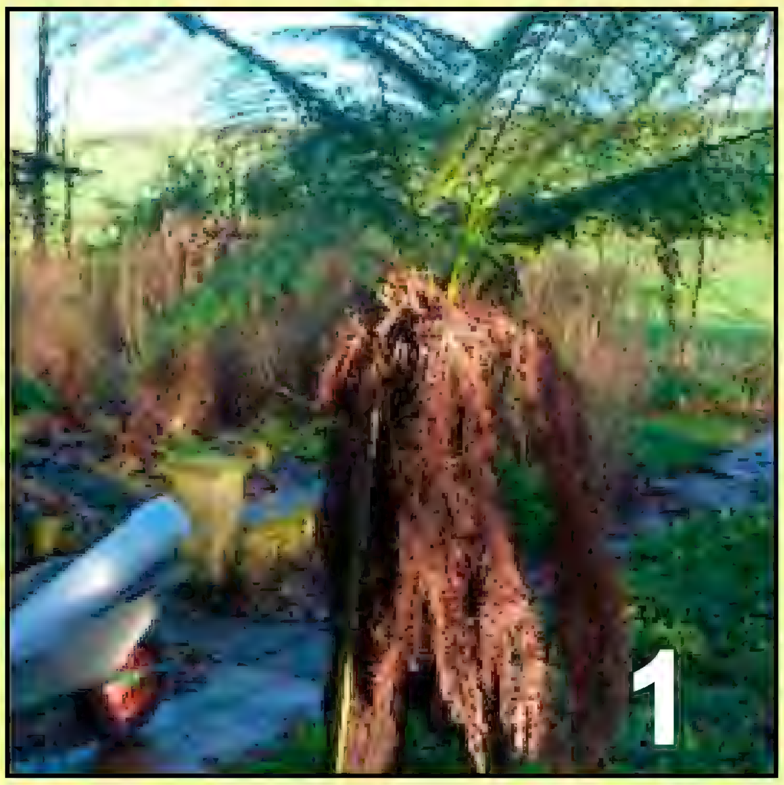
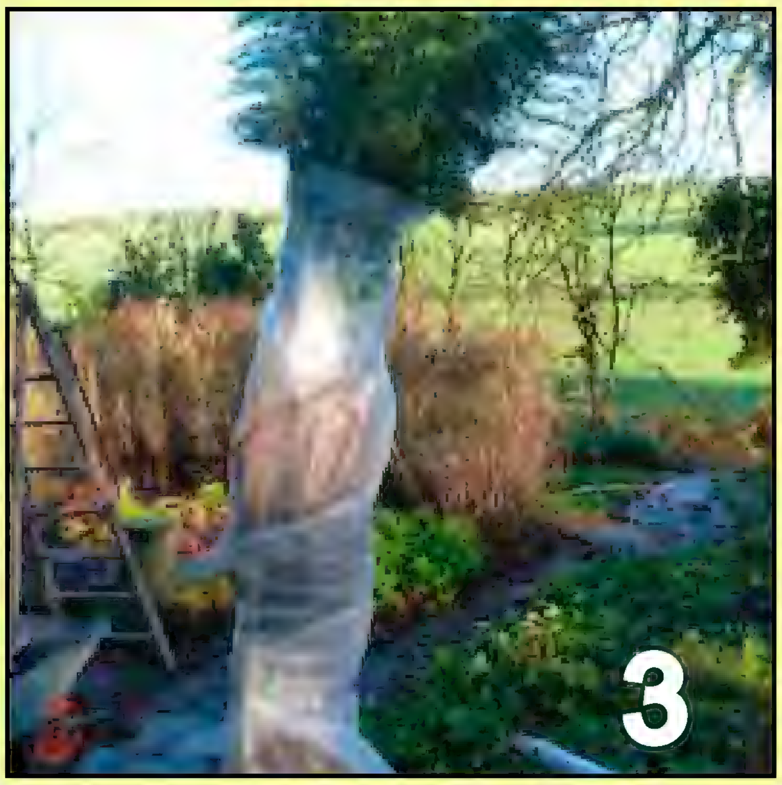
The Tree Fern in Winter.



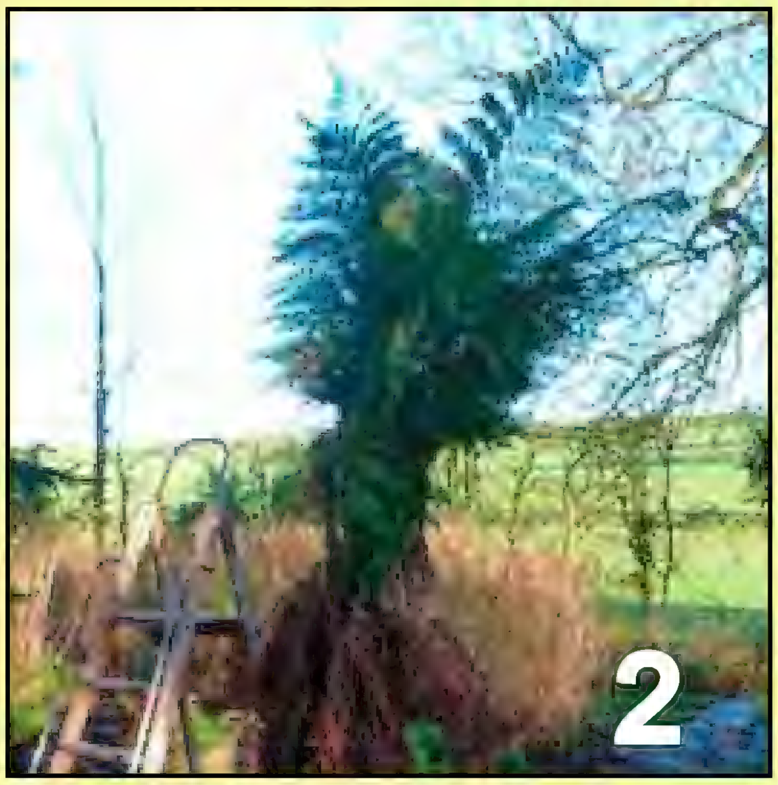


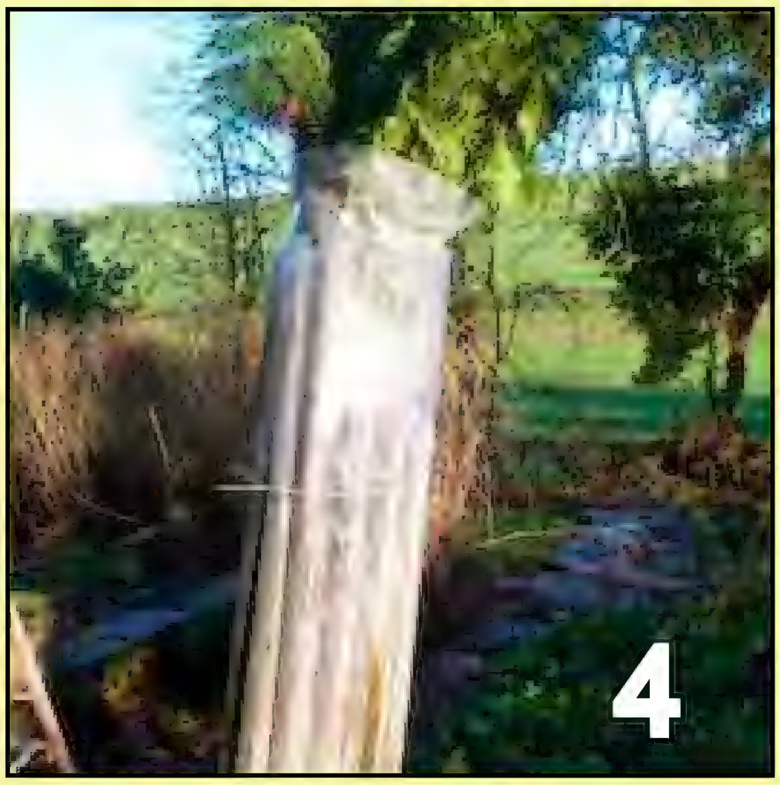
1. The fern is staked and watered.
2. The fronds are tied up.
3. I bubble wrap the whole, notice that it rises well above the top of the trunk.
4. Plastic sheeting is strapped on.

Notice that it is still possible to water from the top, especially if you push a pipe down between the fronds as there is no bung placed in the crown, only the frond mass provides insulation above the trunk top.

This method has worked well for me over several years, perhaps because the clear plastic give a degree of greenhouse effect.

Neil Timm





Not Where you'd Expect Them

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There are always surprises when you grow ferns. How many times has something 'turned up' in a spore sowing about which you have absolutely no idea what it is or where it came from? That happened to me last year with a complete batch of sporelings which I had very reasonably labelled *Diplazium australe* because the spore for it had been harvested from a *Diplazium australe* I'd had for years. The entire tray turned out to be a totally different plant; one that I'd never seen before, let alone cultivated: *Hypolepis dicksonioides.* This mysterious interloper has proved to be one of the fastest-growing ferns I've ever had, and a year later it has fronds 90cms high, with 1cm thick stipes and rhizomes creeping purposefully out of the 25 litre terracotta pot I've had to provide it with. It's fast becoming a prized possession (figs. 1 & 2). In my view this must rank as the handsomest member of its genus, on a different scale but as lovely as the delicate and delightful *Hypolepis millefolium*. However *Hypolepis dicksonioides* is not what this brief note is about, though its inexplicable appearance and exciting development certainly illustrate my point about the mystery and magic we fern-growers can experience.

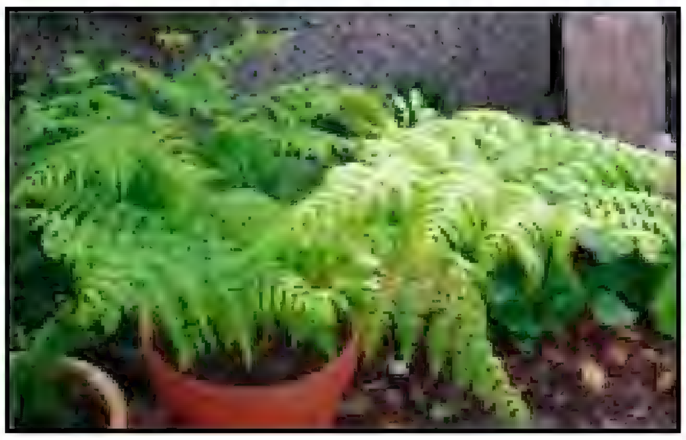

Fig. 1. *Hypolepis dicksonioides* with fronds 90cms high

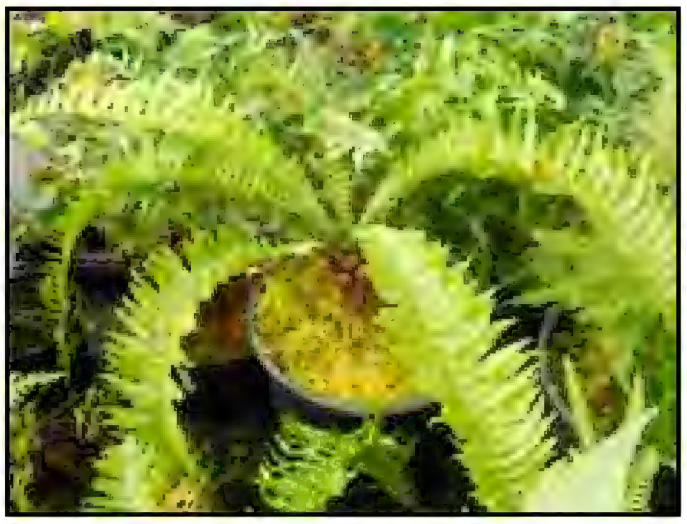

Fig. 2. *Cranfillia (Blechnum) longicauda* can have 2 metre fronds

A wonderful new *Blechnum* species was introduced into UK cultivation a few years ago: *Blechnum longicauda* - *Cranfillia longicauda* for those who like to keep abreast of the botanists' newspeak. This magnificent fern is said to have fronds over two meters long in its home territory on Alexander Selkirk Island (Juan Fernando Archipelago). Mine have never got anywhere near that size, but that has never prevented them from regularly reproducing themselves vegetatively from outgrowths along the rachis towards its apex. Pat Acock referred to this fern and its vegetative propagation in the Pteridologist recently. His article includes a photograph of a propagule/bulbil where it seems typically to occur; that is, on the rachis. It is easy enough to propagate this species by layering the part of the frond carrying the bulbil. I had done this several times in the past, and just over a year ago layered a couple of fronds, and now have two healthy, but still small, daughter plants in pots. Although still juveniles, they both seem determined to multiply themselves and each has produced several bulbils. What is surprising however is that the bulbils are quite unlike those just described. Rather than occurring as outgrowths on the rachis, these bulbils are growing on the upper surface of the frond laminae. With their simple flag-like fronds they resemble the bulbils found on ferns such as *Woodwardia prolifera* or *Asplenium dimorphum*, rather than those usually seen on *Blechnum longicauda* (fig.3). It would seem therefore that this species has two types of vegetative propagation. To my knowledge bulbils of this second type have never been reported as occurring on more mature plants, and if this turns out to be the case, it must be conjectured that this bulbil dimorphism is a phenomenon determined by maturity.

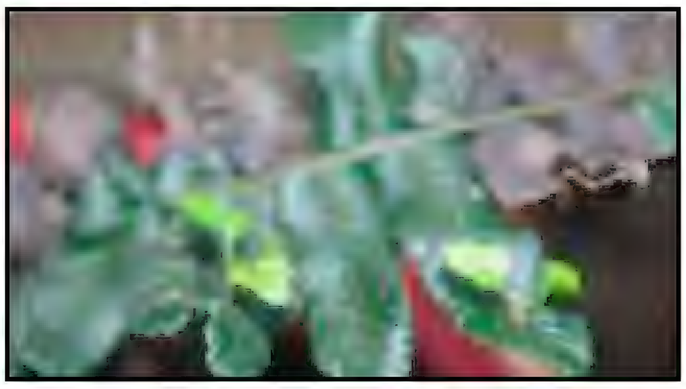

Fig. 3. The unusual bulbils growing on *Cranfillia* (*Blechnum*) *longicauda*

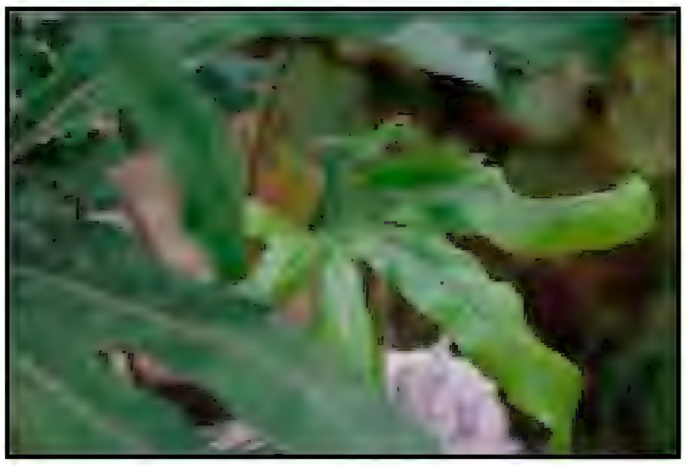

Fig. 4. *Neocheiropteris palmatopedata* with fronds shaped like a hand

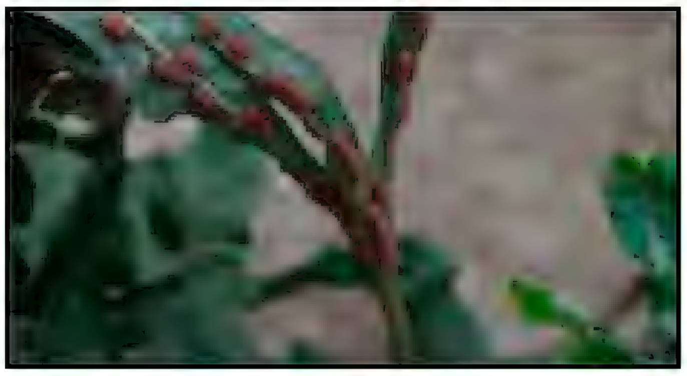

Fig. 5. The sori growing on the stipe of *Neocheiropteris palmatopedata*

Another thing that has surprised me this year concerns the rather strange placement of sori in *Neocheiropteris palmatopedata.* A member of the *Polypodiaeceae* and endemic to China, this fern has very remarkable fronds, which are shaped like a hand with widely stretched fingers (fig. 4). Although I understand that it grows on the forest floor in its native habitat, I grow my plant in a rattan wall basket, where it has quickly produced a number of new fronds; I would definitely rate it as an easy fern to grow. Last year however I noticed several brown growths on what I judged to be the upper stipe. When I noticed these growths they were already disintegrating and rather than recognizing them as sori I took them to be some kind of pest (the residue of some fiendish new species of Oriental scale-insect?). Accordingly I spent time scraping them off and hoping they wouldn't come back. Well, they have come back, and this year it's patently obvious what they are, and it's much easier to identify them as sori this time because there are plenty of them on the frond laminae as well as on the rachis-stipe junction (fig. 5). The problem had been that although I was thoroughly familiar with seeing sori on various parts of the lamina, I had never seen them in this position before. The old saying: 'Live and learn' comes to mind.

Ferns in South-Western U.S.A

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My wife and I had a long trip in April and May to the south west area of the United States. The goal of the trip was mainly visiting the special natural highlights in the region. In a 9000 kilometre tour we visited all of the famous places between the Pacific Coast in the west to White Sands in New Mexico and from Saguaro NP in the south to Lake Tahoe in the north, altogether 30 national parks, national monuments and state parks. Although not the reason for the trip, and not the best season, we also spotted some interesting ferns.

Our trip started in Las Vegas and and from there via Hoover Dam to Joshua Tree National Park, Organ Pipe Cactus National Monument and Saguaro National Park. After admiring the interesting desert flora and landscape we travelled eastwards to White Sands in New Mexico, with its spectacular snow-white dunes of gypsum, and then returning northwest to Arizona. Petrified Forest NP and Barringer Crater had been the next targets before we visited Walnut Canyon NM, with its ancient cliff dwellings of the Anasazi time. The steep southern slopes and cliffs of the canyon are very dry and the vegetation is dominated by typical shrubland. The altitude is from 1900 to 2100m metres above sea level. Utah Juniper (*Juniperus utahensis*) and Alligator Juniper (*J. deppeana*) are the frequent small trees. Interesting plants are Banana Yucca (*Yucca baccata*) and some other yuccas. The very beautiful flowering Scarlet Hedgehog Cactus (*Echinocereus coccineus*) and some Opuntias also occur. Three cryptogamic vascular plants are listed for the canyon: Bluntleaf Spikemoss (*Selaginella mutica*), Wright´s Cliff-brake (*Pellaea wrightiana*) and Fendler´s Lip Fern (*Cheilanthes fendleri*). We could see only the latter (Fig.1). At one place it grew surprisingly together with *Echinocereus coccineus* (see Fig.2). A very unusual plant community.

Via the Grand Canyon we went on to Lake Powell, Monument Valley, Mesa Verde NP, Capitol Reef NP and Bryce Canyon NP. On the path to the Rainbow Bridge and below the Glen Canyon Dam we spotted ferns, but only Southern Maiden-hair (*Adiantum capillus-veneris*) and *Equisetum laevigatum*. *Adiantum capillus-veneris* prefers wet rocks and is a good marker of groundwater overflows in the horizontal seams of the sedimentary rocks. A very impressive example is the rock seams below the Glen Canyon Dam. The dam has an height of 180 metres and the water of Lake Powell passes under high pressure through the rock strata. A long green line of the Maidenhair Fern marks the overflow (see Fig.3).

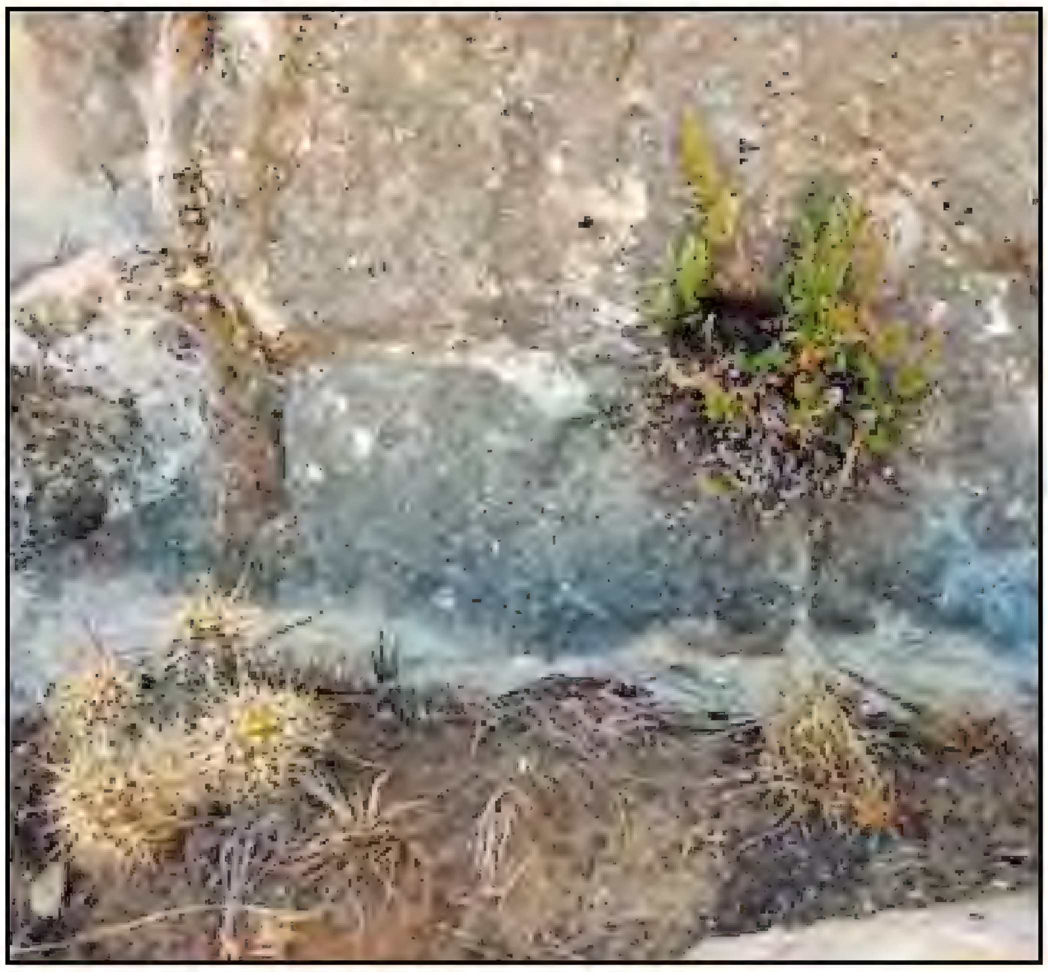

Fig. 2. *Cheilanthes fendleri* growing together with *Echinocereus coccineus*, Walnut Canyon, Arizona

Some interesting ferns could be seen in Zion NP. The deep main valley of the park (700 metres altitude difference from bottom to the highland flat) is a real oasis in the more

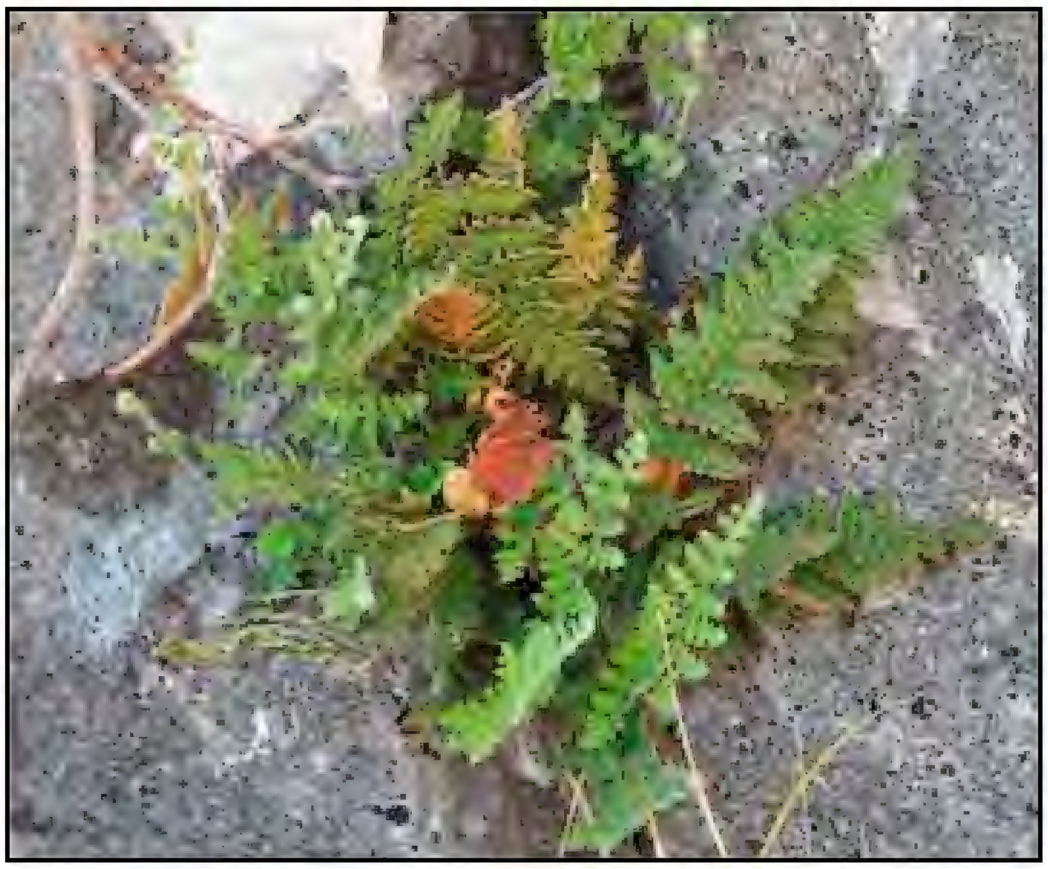

Fig. 1. Fendler’s Lip Fern, *Cheilanthes fendleri,* Walnut Canyon, Arizona

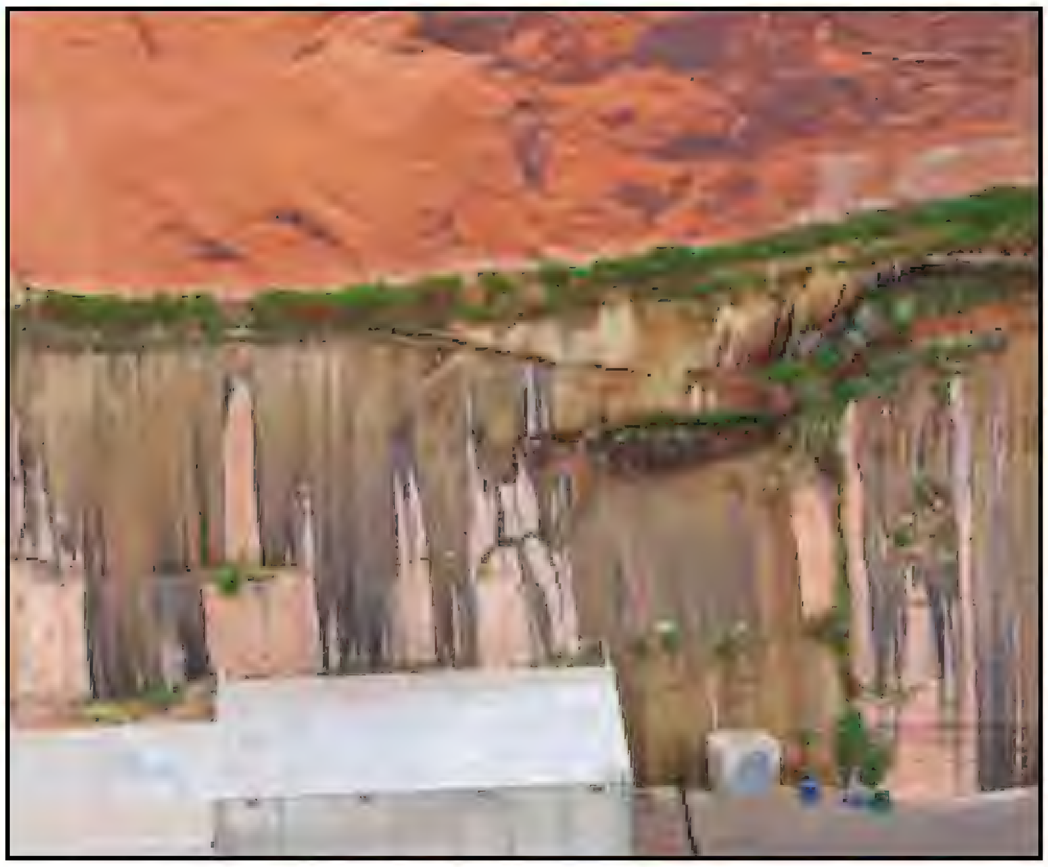

Fig. 3. Below Glen Canyon Dam, a green line of *Adiantum capillus-veneris* indicates water overflow

or less xeric landscape. Besides flowering Opuntias and pillow Phlox we spotted *Pellaea suksdorfiana* and *P. glabella* (Figs.5,6). Rocks dripping with water sported a wonderful plant community; Southern Maidenhair Fern, together with Golden and Red Columbine (*Aquilegia chrysantha* and *A. formosa*), *Dodecatheon pulchellum* and *Smilacina stellata* (see Figs.7,8).

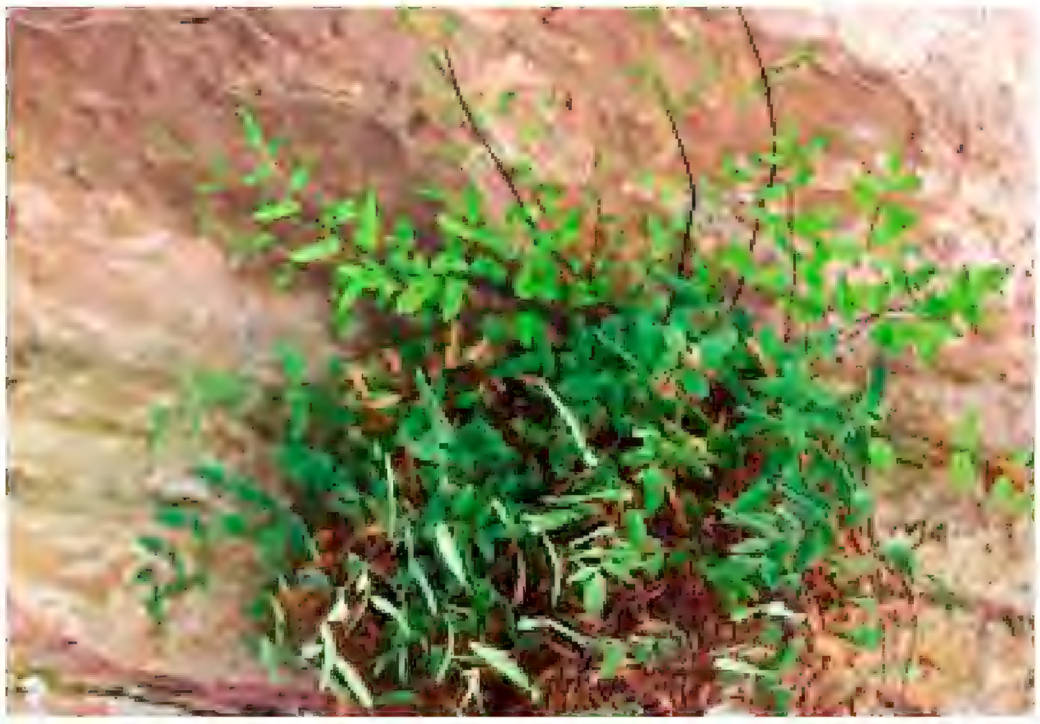
Fig. 5. *Pellaea glabella*, Temple of Sinawava, Zion National Park, Utah

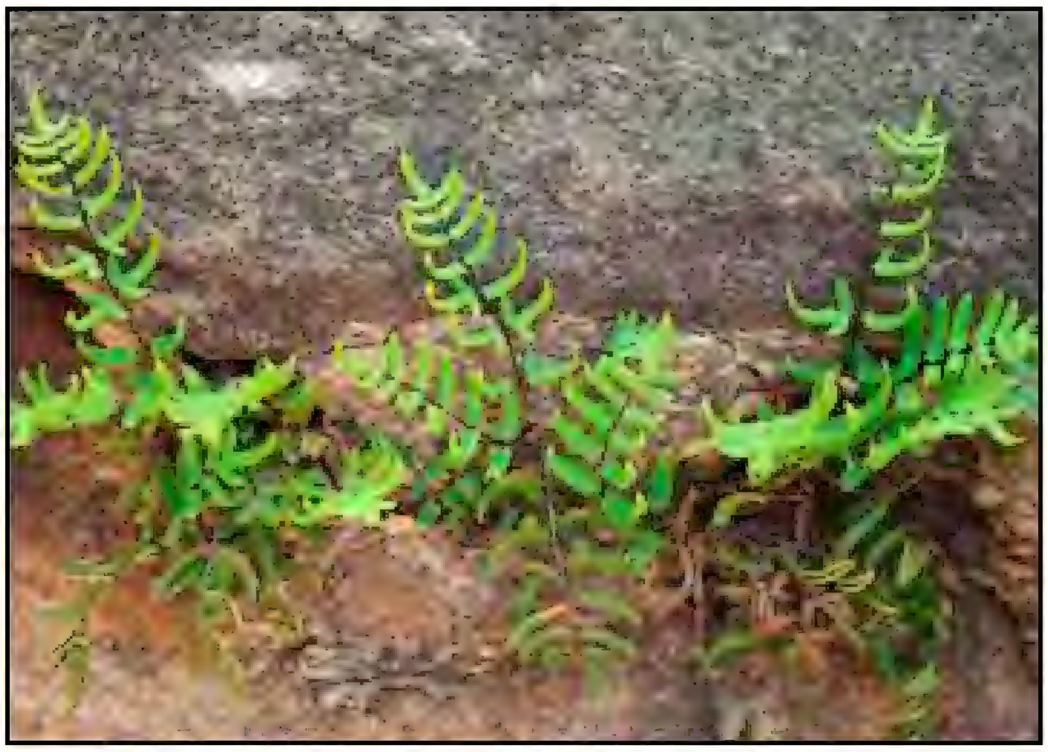
Fig. 6. *Pellaea suksdorfiana*, Zion National Park, Utah

At the bottom of the valley beside the Virgin River we spotted near a Canyon Grape (*Vitis arizonica*) a large population of *Equisetum hyemale*; at one place together with Opuntia – the second curiosity of a plant community (see Fig.10)! What would the plant ecologists call this – a Opuntio-Equiseteum or a Equiseto-Opuntietum or perhaps Ziono-Dubietum? Another place close to the river had *Equisetum* x *ferrissi* together with *E.arvense* (Fig. 9).

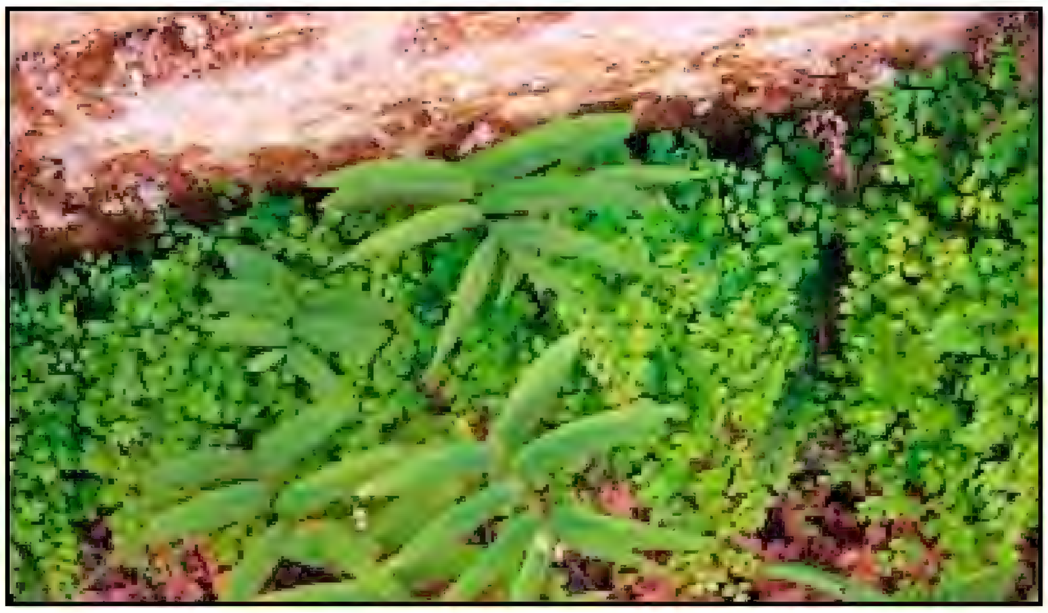
Fig. 7. *Adiantum capillus-veneris* with *Smilacina stellata*, Zion National Park, Utah

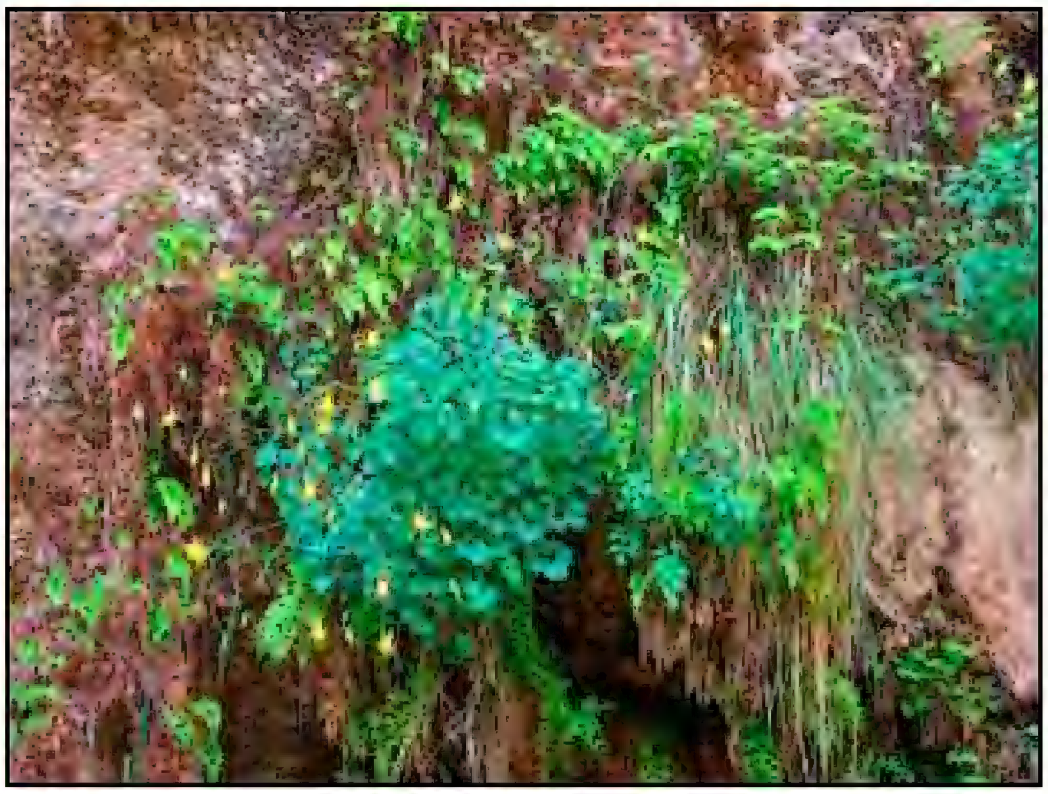
Fig. 8. *Adiantum capillus-veneris* with *Aquilegia chrysantha*, Temple of Sinawava, Zion National Park, Utah.

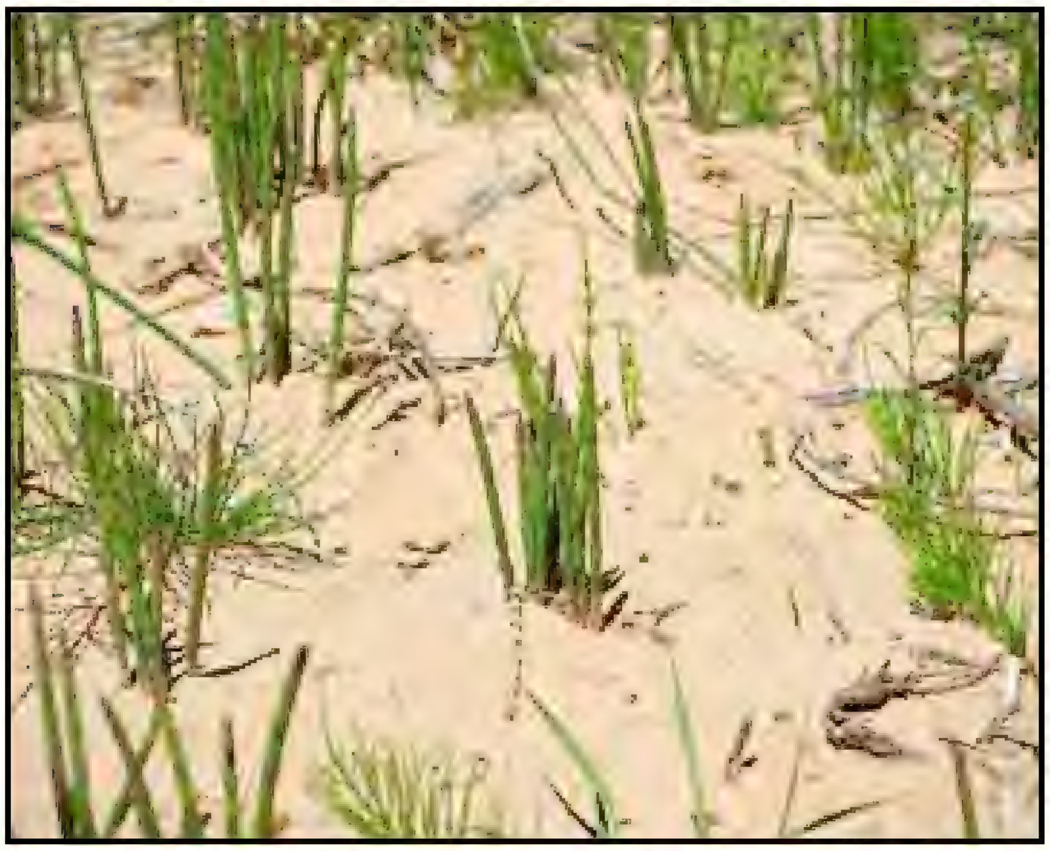
Fig. 9. *Equisetum* x *ferrissi* together with *E. arvense*, Temple of Sinawava, Zion National Park, Utah.

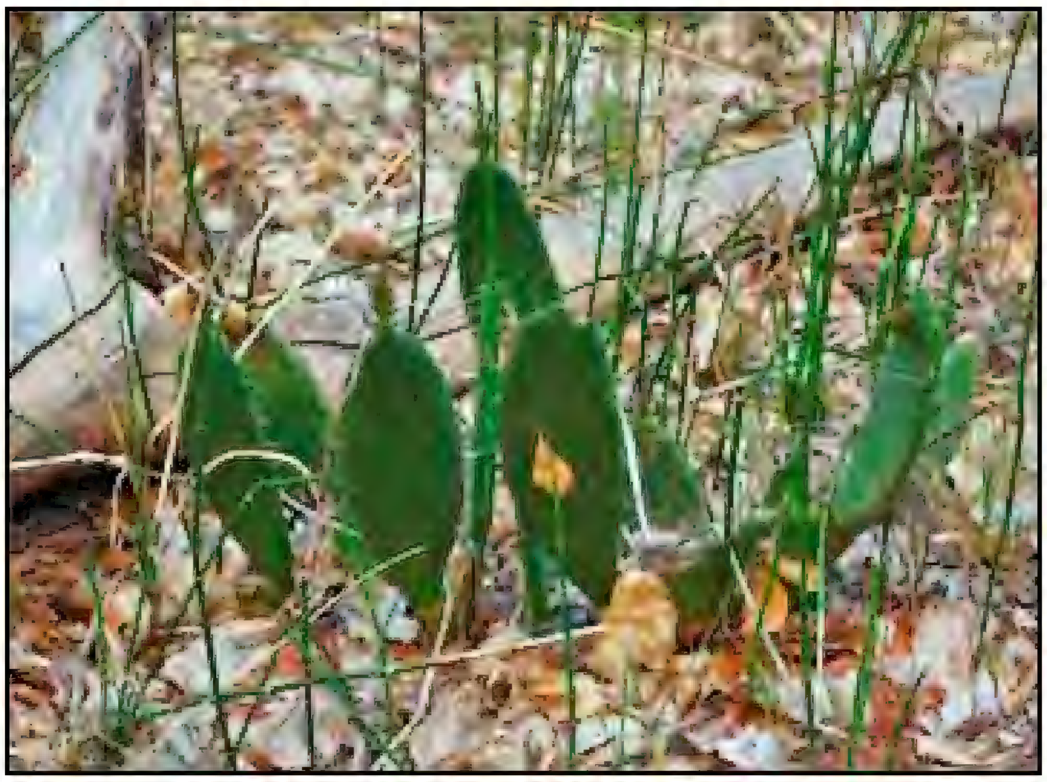
Fig. 10. *Equisetum hyemale* with *Opuntia*, Temple of Sinawava, Zion National Park, Utah.

Ferns in South-Western U.S.A

We next went from Zion via Valley of Fire State Park, Death Valley, Mono Lake, and Donner Pass to San Francisco. Before reaching the city we made an excursion to Muir Woods NM, not far from the Golden Gate Bridge. It is one of the few still existing old-growth Redwood forests. Entering the park the high redwoods (*Sequoia sempervirens*) aroused a feeling like entering the cathedral of Cologne (Fig.11).

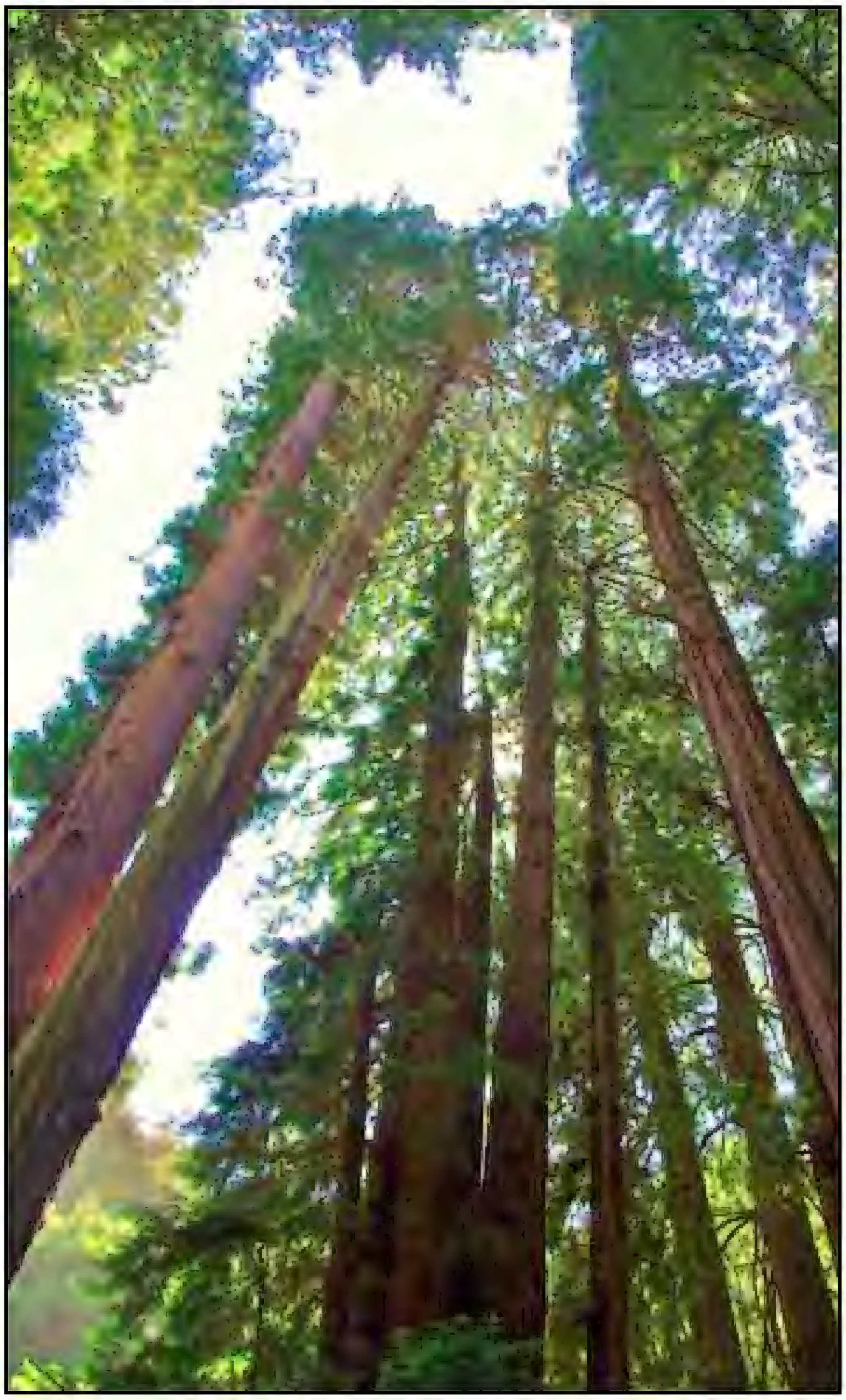

Fig. 11. Like the pillars of a cathedral: *Sequoia sempervirens* in Muir Woods, California

The moisture of the nearby Pacific enables much plant life under the big trees and the green was a welcoming contrast after weeks in the desert regions. A green carpet of *Oxalis oregana* covers the ground where it is not too shady. Here also some well known ferns occur, especially in the wet conditions near a creek: *Polystichum munitum* (very common here); *Athyrium filix-femina* ssp. *cyclosorus* and *Woodwardia fimbriata*. We spotted also a large stand of *Adiantum aleuticum* and a group of *Polypodium californicum* on a fallen branch (Figs.12-15).

The last week began in San Francisco and was filled with visits to Yosemite and Sequoia NP. Starting in the morning in Mariposa, our satnav took us on a roundabout route to Yosemite; we used this opportunity to make an

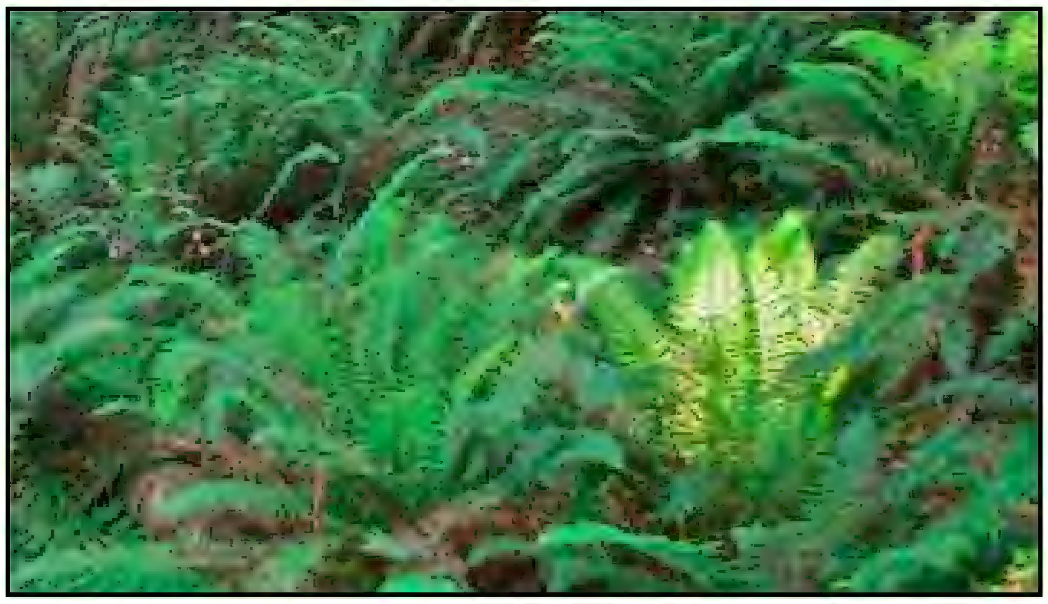

Fig. 12. *Polystichum munitum*, Muir Woods, California

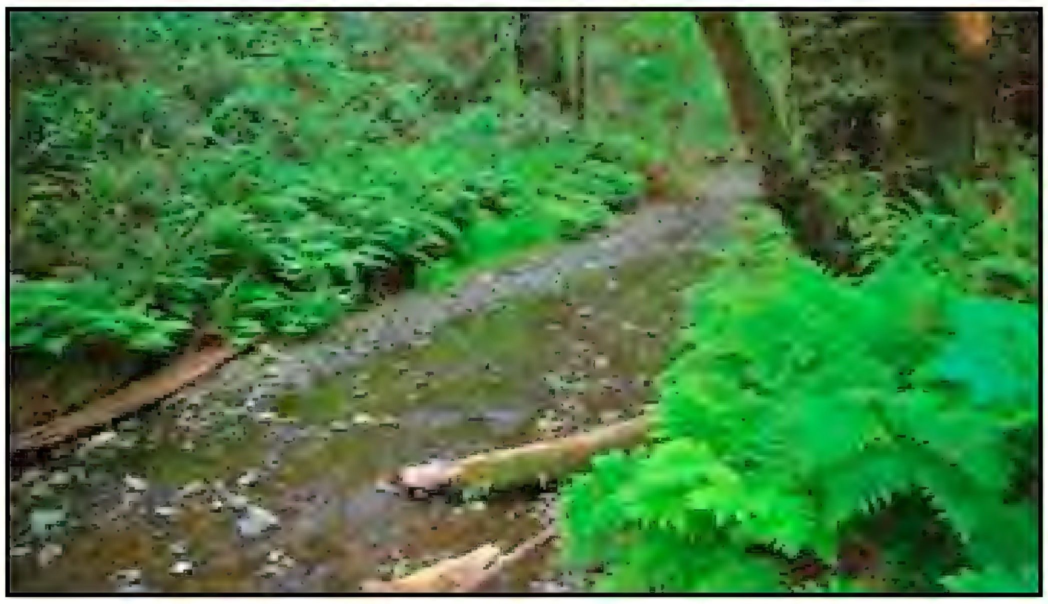

Fig. 13. *Athyrium filix-femina* ssp. *cyclosorus*, Muir Woods, California

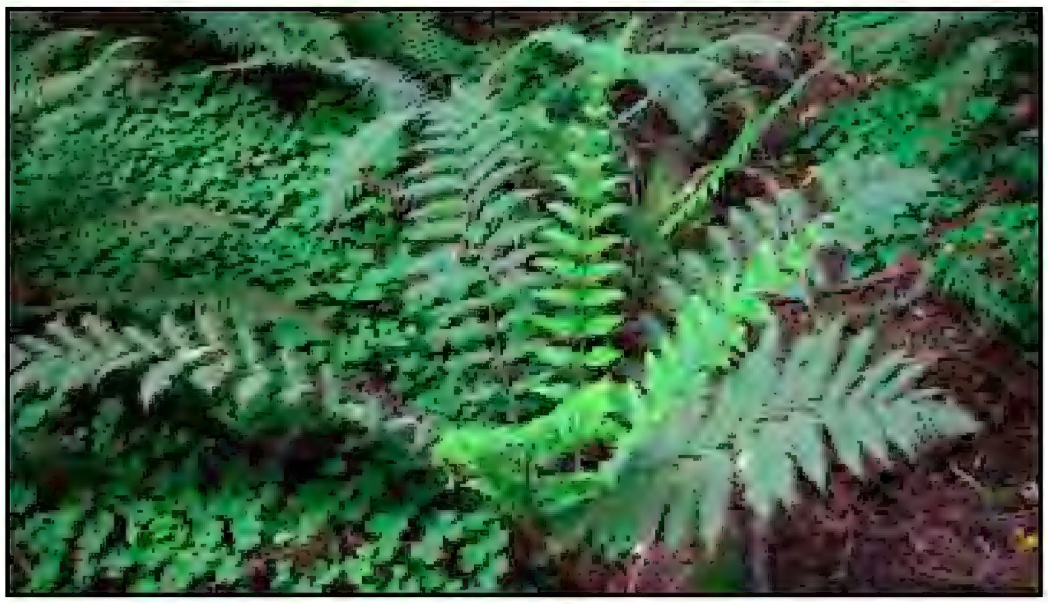

Fig. 14. *Woodwardia fimbriata* with *Oxalis oregana*, Muir Woods, California

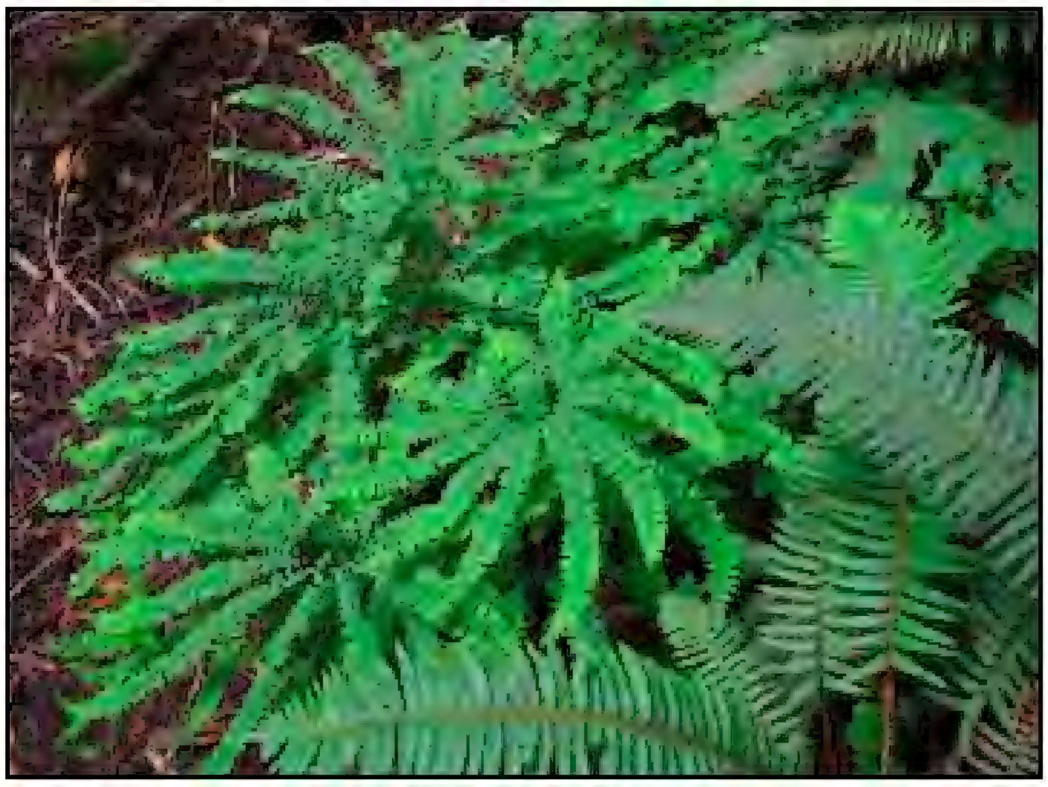

Fig. 15. *Adiantum aleuticum* with *Polystichum munitum*, Muir Woods, California

excursion to the Mariposa Grove to see the Giant Sequoias (*Sequoiadendron giganteum*). We enjoyed the hiking tour on the Grizzly Giant Loop Trail through the grove. Snow was gone and the ground under the trees was very dry, with little vegetation. At some places large stands of *Equisetum hyemale* occurred, a sign of water in the ground. The Sequoia group *The Bachelor and Three Graces* frames one very picturesque stand of Equisetum (Fig.17).

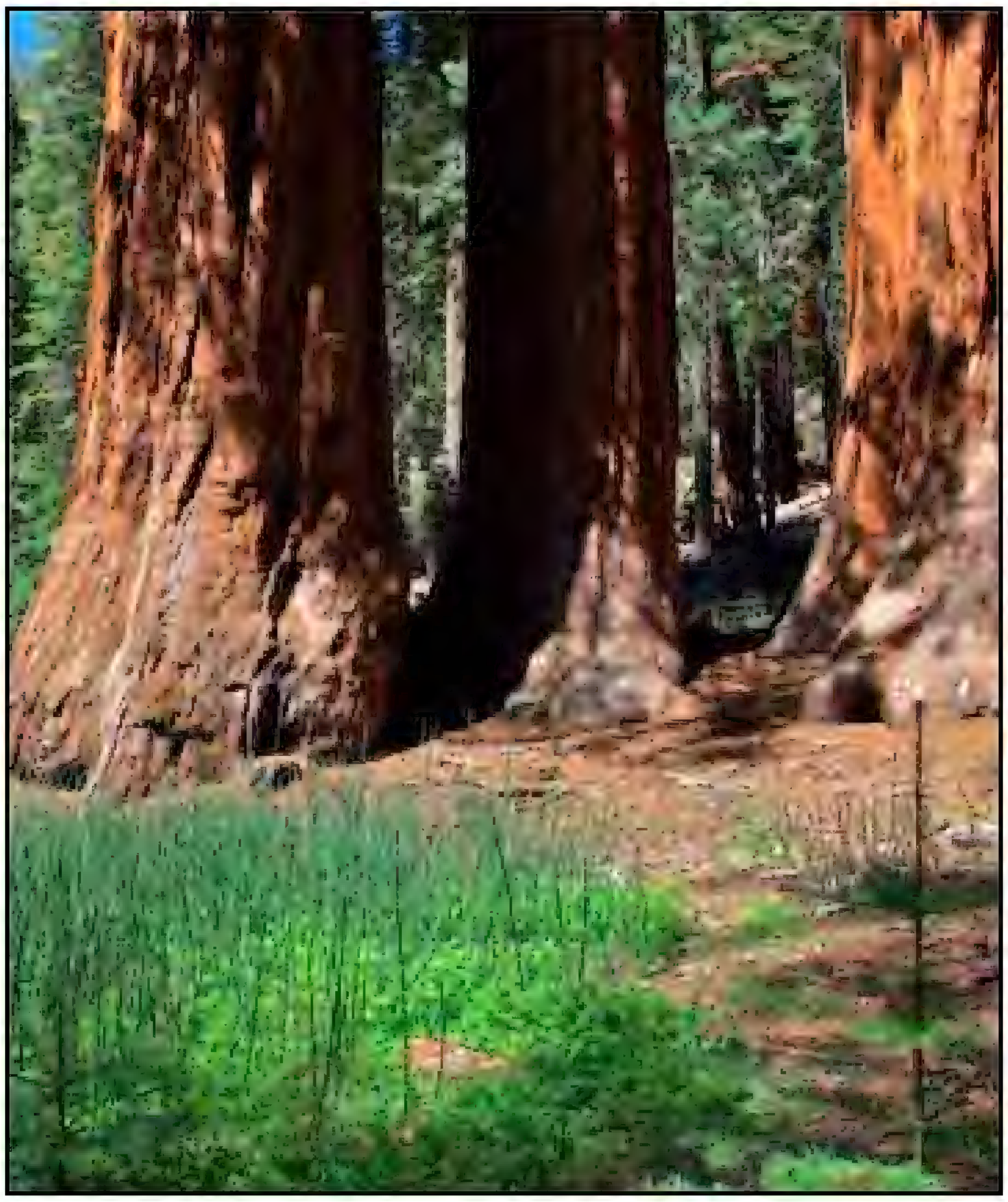

Fig. 17. *Equisetum hyemale* with the "Three Graces", Mariposa Grove, Yosemite National Park, Sierra Nevada, California

The ferny highlight for us was in Yosemite Valley. A rock beside the road was home of four fern species: Narrow-leaved Sword Fern (*Polystichum imbricans*), Indian´s-dream (*Aspidotis densa*), Goldback Fern (*Pityrogramma triangularis*) and a Cystopteris species (Figs.18,19).

The last goal in the Sierra Nevada was the Sequoia NP. In comparison with Yosemite the vegetation was richer under the trees, at least in the parts of the park we visited. Flowering *Yucca elata* was the first we saw at the park entrance near Three Rivers. The only one interesting fern we found was *Dryopteris arguta* (together with *Silene laciniata* var. Californica) on our way to *General Sherman*, the biggest Sequoia-tree here, with a trunk of 11 metres in diameter (Fig.20). As well as the Silene we could admire other flowering plants in the park: Dogwood (*Cornus florida*), Torrey`s Blue-eyed Mary (*Collinsia torreyi*) and some others we could not identify.

Visiting Indian Canyons and Thousand Palm Oasis near Palm Springs with its Washingtonia palm forests was the last highlight of a wonderful trip.

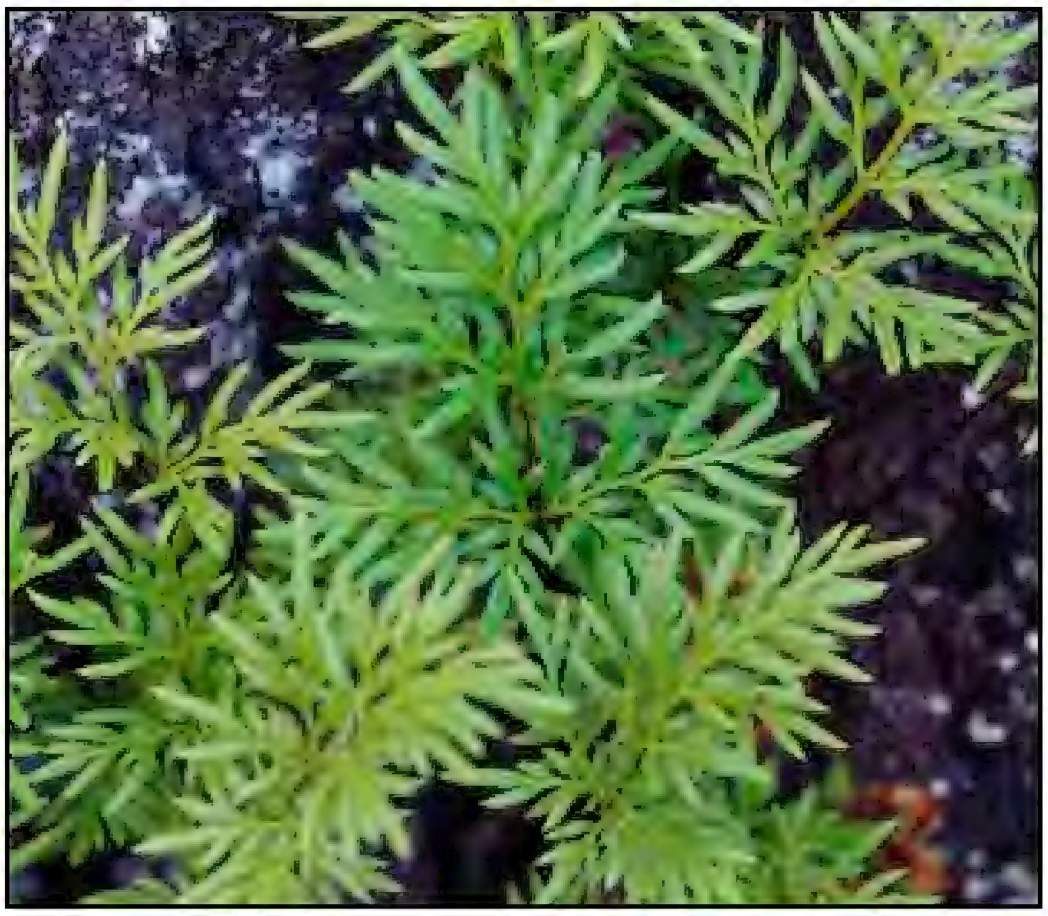

Fig. 18. *Aspidotis densa*, Yosemite National Park, Sierra Nevada, California

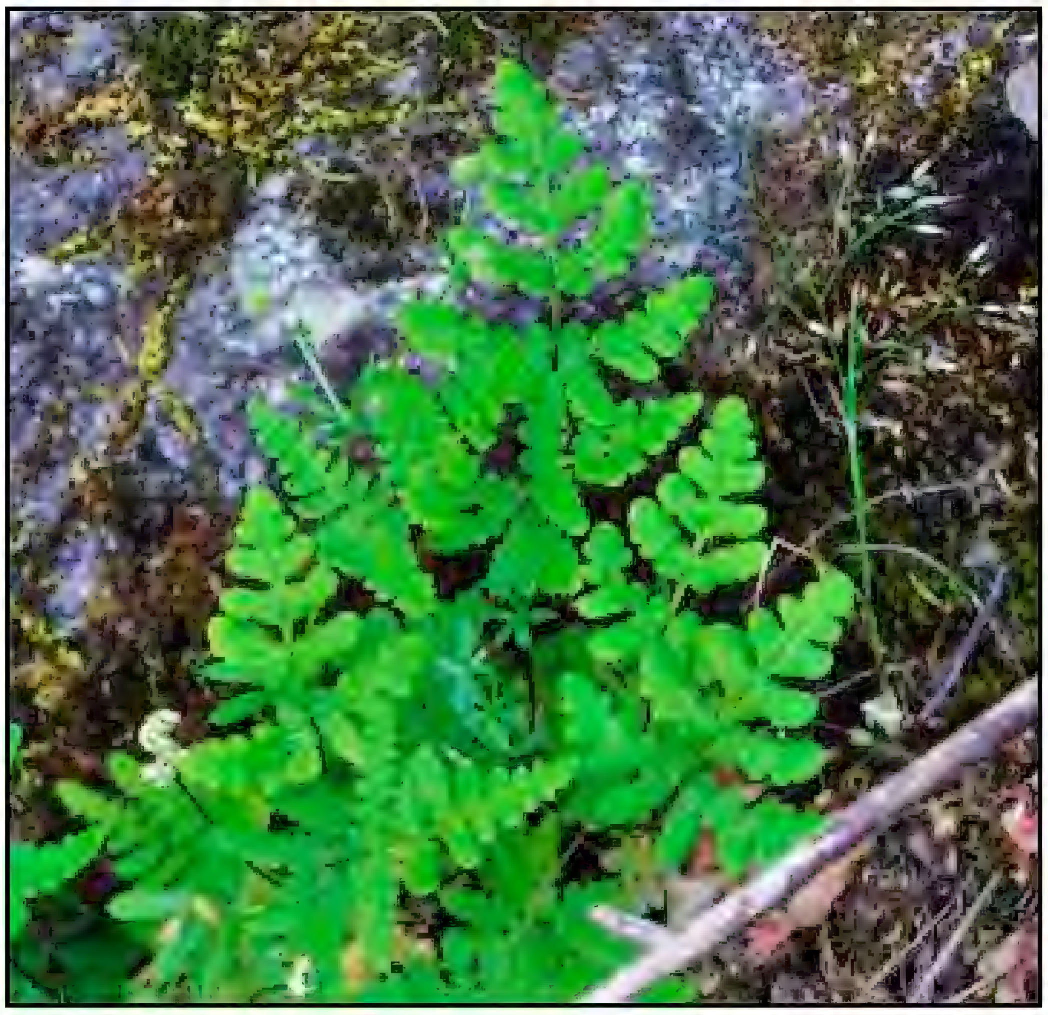

Fig. 19. *Pityrogramma triangularis*, Yosemite National Park, Sierra Nevada, California

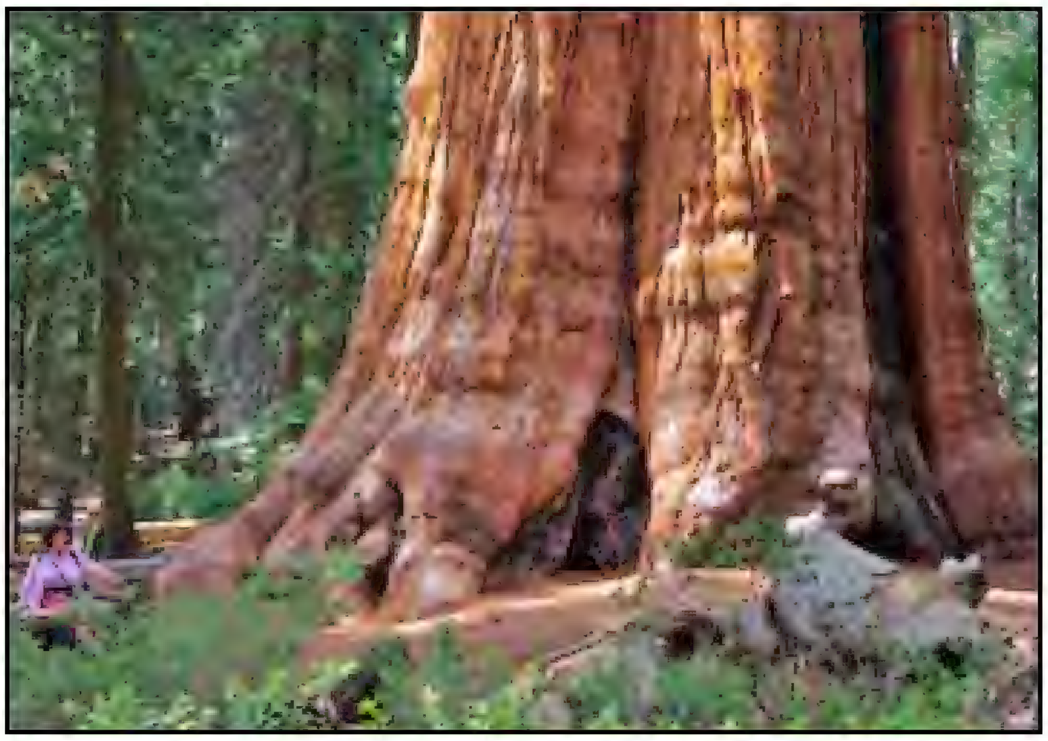

Fig. 20. "General Sherman" (*Sequoiadendron giganteum*), Sequoia National Park, Sierra Nevada, California

A Note on the Ditch Ferns of North East Norfolk

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INTRODUCTION

Norfolk is not noted for the abundance of its native ferns. Ditch ferns present particular challenges as they are closely associated with agriculture. They are often difficult to access, being on private land, and maintenance of the ditch is inimical to their growth. I have been fortunate in living on a farm with ditches that retain a diverse fern community. I will examine the reasons for their survival, describe the ferns themselves and their distribution and make some comments in regard to ditch ferns in North East Norfolk more generally.

THE LYNGATE FARM DITCHES

The farm is situated immediately beside Antingham Ponds, about a kilometre north of the outskirts of North Walsham. It has two double ditches (Fig. 1) each some 7 metres across from bank to bank and 1.5 metres deep, running in parallel eastwards for about 70 metres before discharging into the abandoned section of the North Walsham and Dilham Canal. These ditches are some 200 metres apart. For some time I was unable to fathom the purpose of such large structures in relation to the insignificant amount of spring water that they carried. After various enquiries I was referred to the chapter in Nathaniel Kent's 1796 Agricultural Survey of Norfolk on *Grass Land - with Hints for its Improvement.*

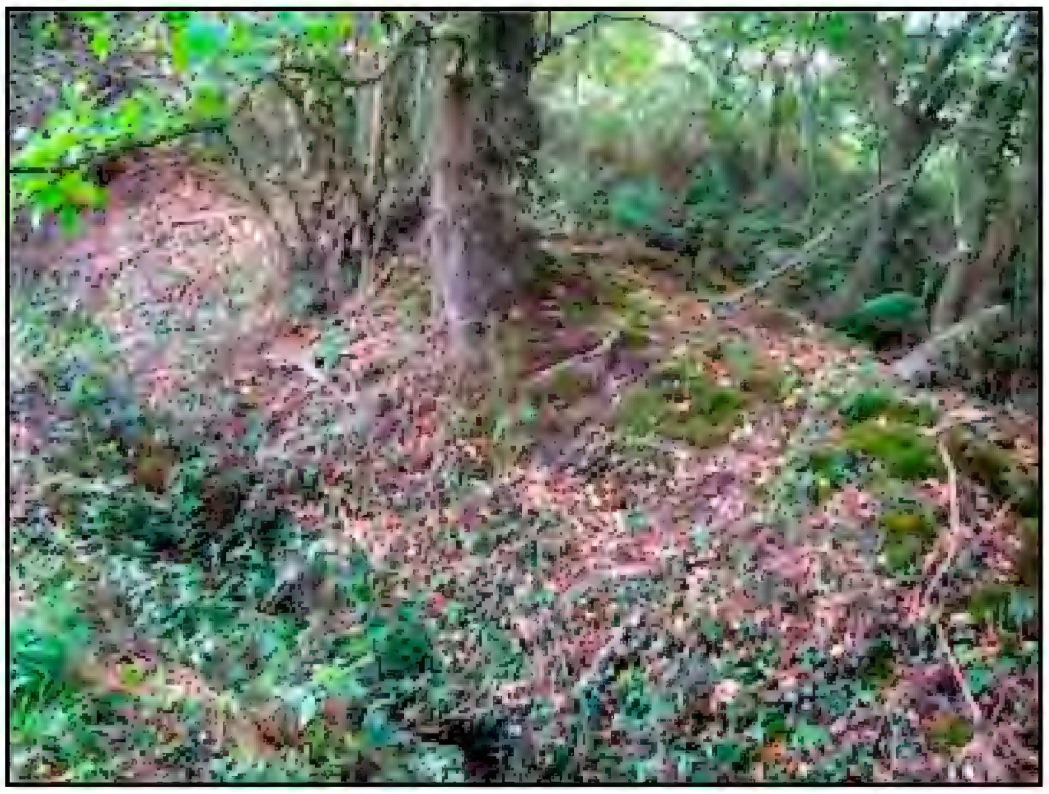

Fig. 1. The tree lined northern double ditch, Lyngate

Kent refers to wet meadows in many parts of the county which "*are reckoned much inferior to the arable land, and in general very much neglected*". He continues "*they make a bad appearance being spongy and full of rushes*". And no doubt also of ferns! He ascribes the wetness to the springs which issue into the meadows and then describes the accepted Norfolk method of draining them. "*keep the rivulet open to a free discharge in the lowest parts and to cut two very deep drains, one on each side, parallel with the rivulet, just between the arable and the meadow lands, where the springs generally show themselves; and the two drains if they are sunk deep enough to get below the springs, will nine times out of ten lay the meadows dry.*"

It is to be supposed that only wealthy land owners would be able to afford and commission works on such a scale. The labour and organisation required would have needed to be considerable. In the case of Lyngate this would have been the Gunton Estate of the Suffields The double ditches are emptied into by other large single ditches and the network when completed, presumably in the eighteenth century, would have drained into the then uncanalised upper River Ant.

THE FERNS

It is not always appreciated that North East Norfolk, away from the immediate coast, has a relatively maritime climate with the highest rainfall in East Anglia. Local weather stations record average annual totals in the region of 700 mm. This compares to less than 500 mm in the driest parts of Essex. The area is also particularly given to mists and heavy dews. The ditches have their own microclimate, being deep, permanently wet and shaded by trees. They are therefore cool in summer and relatively frost free in winter. Furthermore spring water emerges at a fairly constant temperature throughout the year. The flow is very even and little influenced by ground water run-off even after storms. All of these features are of course particularly conducive to the growth of ferns.

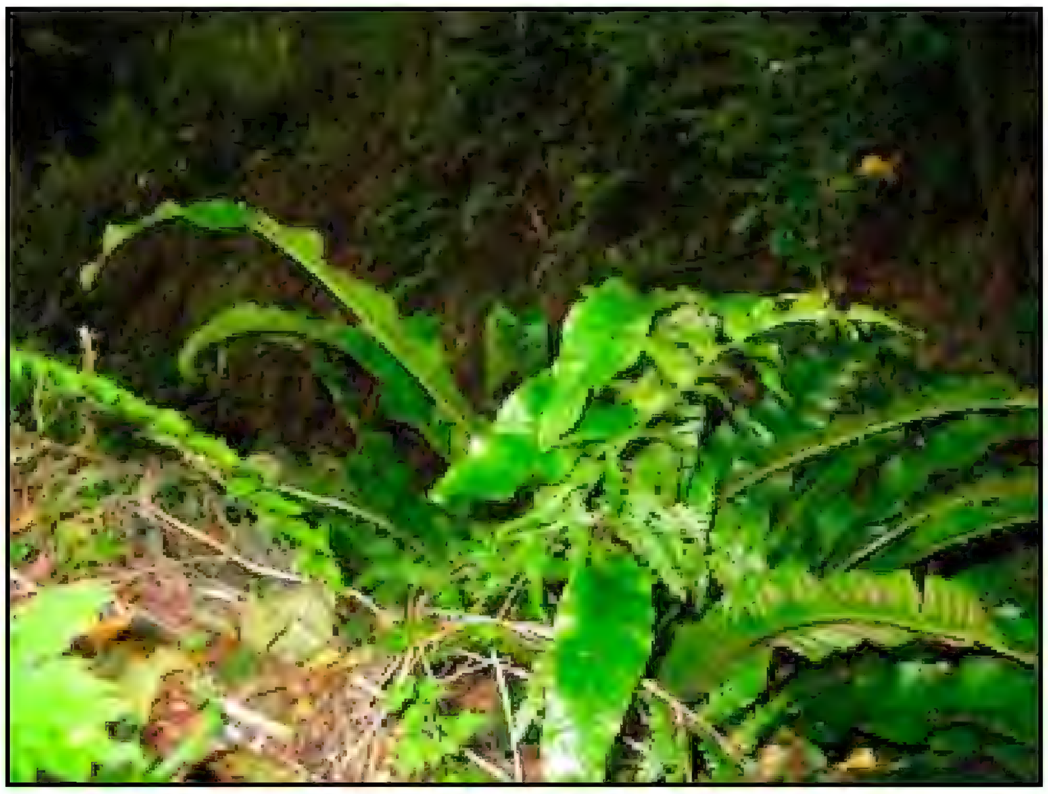

Fig. 2. Hart's-tongue Fern with Male Fern growing through it and Polypodium on the opposite bank, Lyngate

There are 22 native ferns in Norfolk listed on the website guide of the Norfolk and Norwich Naturalists' Society. (Richmond 2009). When wall ferns, rarities and niche ferns are discounted, there are ten native ferns that could reasonably be expected to frequent ditches. Nine of these are present at Lyngate, the exception being Hard Shield Fern *Polystichum aculeatum,* a species more suited to the clay lands of central Norfolk.

Given that the two double ditches are almost identical there are some interesting differences in their fern populations. The southern ditch structure has Polypody *polypodium sp* on top of the central bank with Hard Fern *Struthiopteris* (*Blechnum) spicant* in the ditches below. It also has Hart's-tongue *Asplenium scolopendrium* (Fig. 2), Male Fern *Dyopteris fillix-mas,* Broad Buckler *Dyopteris dilatata* and Narrow Buckler ferns *Dryopteris carthusiana*.

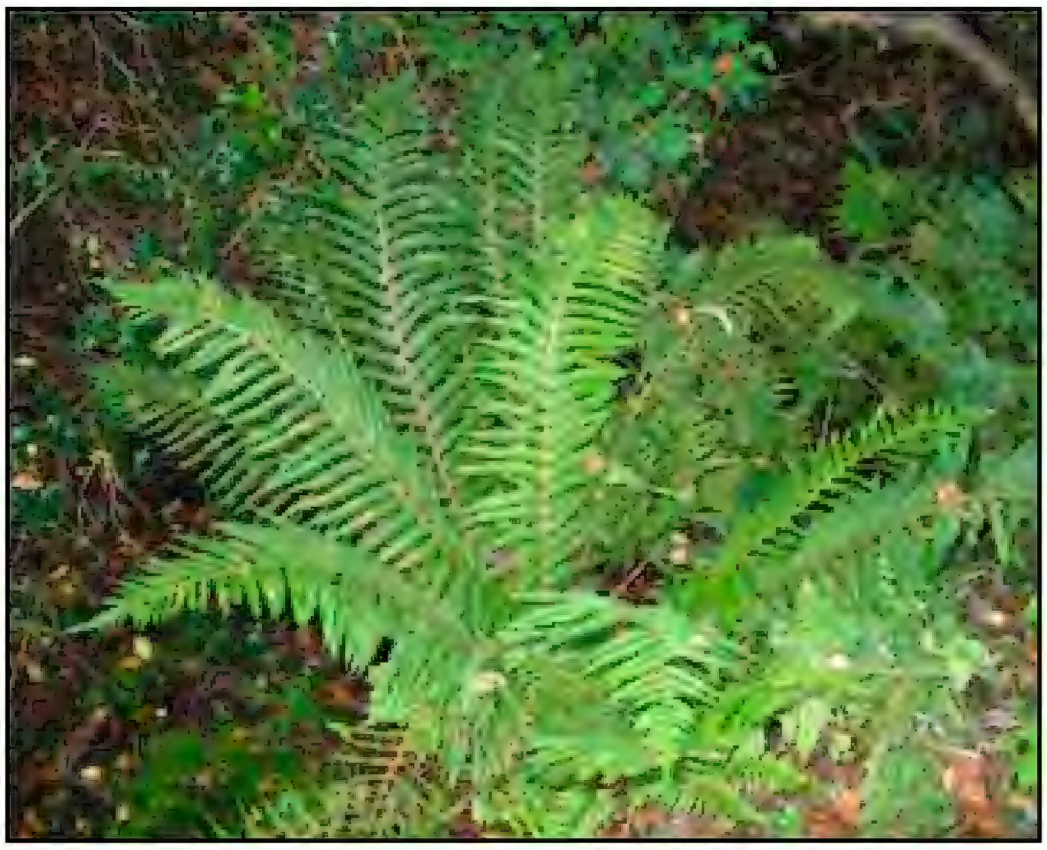

Fig. 3. Soft shield Fern, *Polystichum setiferum*, Lyngate

In the northern ditches Polypody, Hard Fern and Narrow Buckler are absent. However, in addition to Male, Hart's-tongue and Broad Buckler it has Lady Fern *Athyrium fillix- femina*, Soft Shield Fern *Polystichum setiferum* (Fig. 3) and Golden-Scaled Male Fern *Dryopteris affinis* ssp. *affinis* (Fig. 4). The latter is most surprising as it is usually associated with ancient woodland. Other ferns present are a clump of Royal Fern *Osmunda regalis* of some age but of dubious provenace on the side of the artificial lake to the rear of the ditches, and Black Spleenwort *Aspenium adiantum-nigrum* on the nearby road bridge over the canal. Bracken *Pterdium aquilinum* is plentiful on the drier parts of the farm but would not prosper in the damp meadows and, not surprisingly, is absent from the ditches.

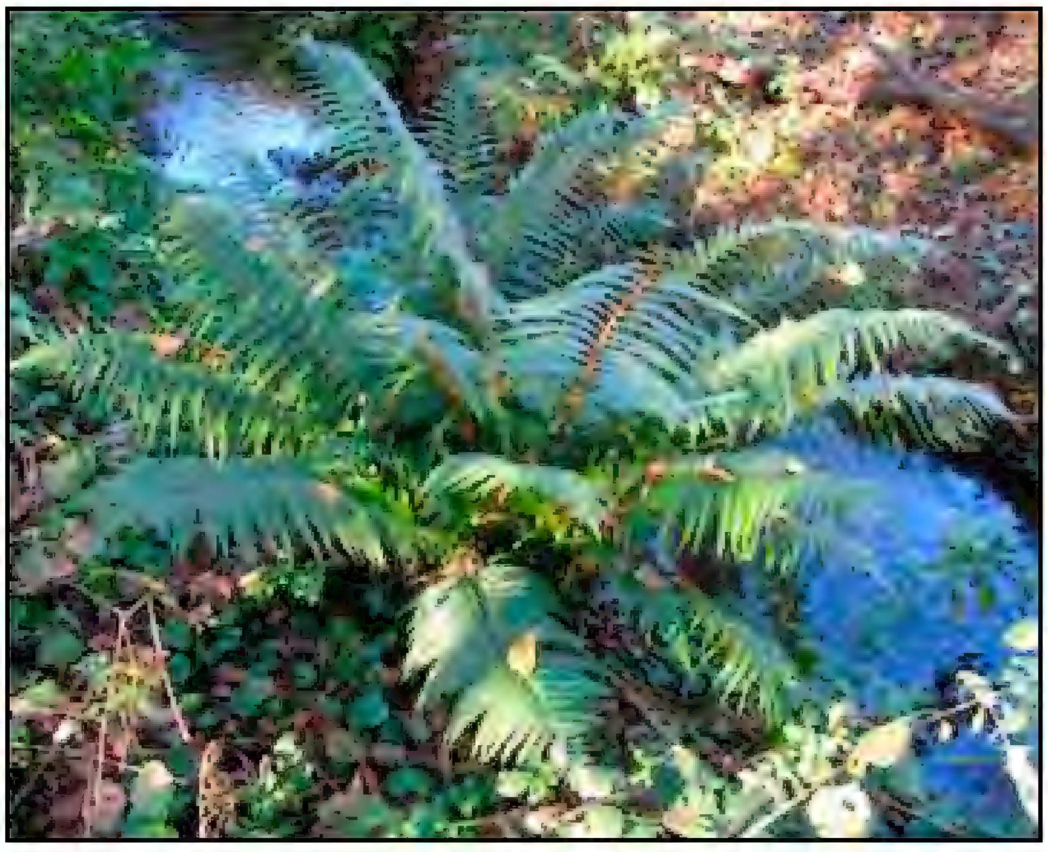

Fig. 4. Golden-Scaled Male Fern, *Dryopteris affinis* ssp *affinis*, alongside the beck at Sustead Common

DISCUSSION

It would seem that the Lyngate ferns are a relic of the relatively diverse fern community which would once have populated the upper Ant valley. An impression of this abundance of ferns can still be gained from the Alder carr woodland in Antingham Ponds, which is a privately owned County Wildlife Site and Bradfield Wood immediately to the north of that. The Lyngate ferns apparently retreated into the ditches as the land was "improved" and found a safe footing where the spade and later the mechanical arm of the digger could not reach them, particularly along the central isle.

There is, however, a noticeable sense of confinement with large clumps of different species packed in together. One 10 metre section of the northern bank is occupied by an unlikely combination of Broad Buckler, Lady, Soft Shield, Male and Scaly Male ferns. With the exception of the Buckler ferns and Polypody, however, they are not thriving. The individual clumps are large and vigorous but there is no sign of succession; it would seem that they are in stasis.

The importance of permanent wetness to diversity is illustrated by dry ditches above the spring line containing only Polypody on the bank top and occasional Male Fern on the bank side. This is evidenced by several other sites I have visited. Seasonally dry ditches may contain two or three native ferns, for example as at Bacton Wood, but at Sustead Common through which the Gur Beck flows, the number more than doubles to seven species. I have found the abundance of species at Lyngate to be unequalled.

However, almost as intriguing is the nearly complete absence of ferns in, or on, the banks of the canal, which was abandoned in the late nineteenth century and is now cloaked with rampant herbage. They have had the time to make an appearance. Is it conceivable that they are tenacious survivors but poor pioneers?

Diversity may also be enhanced, but to a lesser degree, by the cutting of a deep ditch exposing layers of differing soil type. For instance, an acid sandy bank could lie above a chalk stratum below. The Hart's-tongue fern shown in the photograph is thriving in relatively rich sandy loam on the bankside while Hard Fern exists in the poorer gravelly soil near the bottom. On level ground such marked differences in soil type would not pertain.

The lack of canal ferns and the differing fortunes of the ditch species in terms of reproduction raises interesting questions about the dynamics of plant communities and ones which might repay further study.

ACKNOWLEDGEMENT

I would like to thank Dr. Peter Blake, Chairman of the Society's East Anglia Group, who visited the farm and confirmed the species present and who drew my attention to the Survey by Nathaniel Kent. Also Bill Hammond, farmer and custodian of the ditches and their ferns.

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Stewart Island – New Zealand Part 1
A Paradise for Walkers and Ferns

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Stewart Island has some very endearing features: few cars, few people, hardly any roads, mainly tree-covered, good walking tracks and about two thirds of the fern flora of New Zealand.

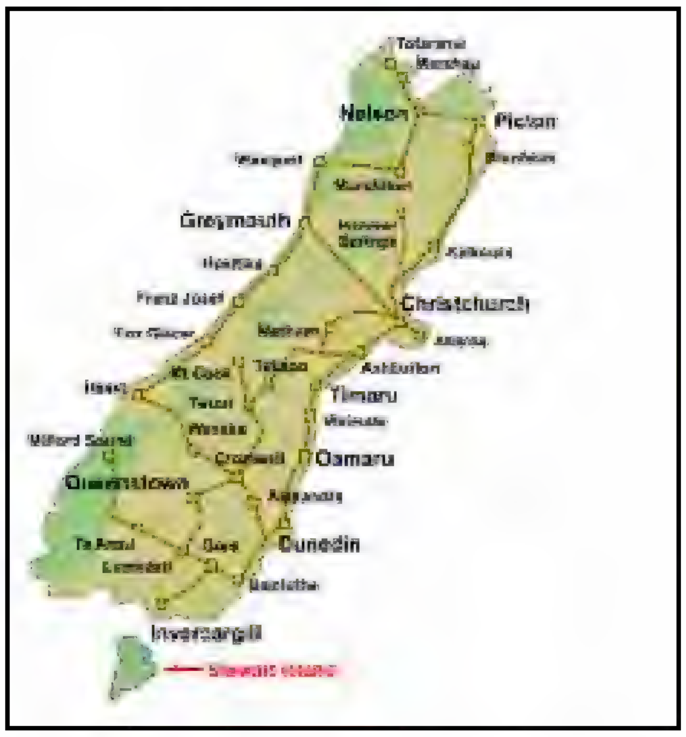

Fig. 1. Stewart Island in relation to New Zealand South Island

It is part of the New Zealand archipelago formed from raised bits of the Campbell plateau, a large, mostly undersea, platform. Much of the current land surface has been formed relatively recently, either by volcanic activity, or by erosion and consequent accumulation of eroded matter. Stewart, the third largest island, has had a land surface since at least the Permian age and its surface is therefore older than most of North and South islands. As part of the Gondwana mass, it has been to and fro between the equator and South pole and has had a warmer climate than today. During the Mesozoic and Tertiary Eras, it was part of the same mass as Southland province and during the Pleistocene both it and Southland were partially glaciated, having snow fields and glacier ice. Beyond this ice there was an alpine flora in grassland and scrub communities. From this, it is obvious that it could have lost some of its previous Gondwana flora and that it could share flora with Southland province and South Island generally.

Two thirds of Stewart – the south western part – were part of the Gondwana land mass and granitic in origin, whereas the north western corner was on the syncline and has a later origin. (All the above information comes from a rather ancient geology book by Graeme R. Stevens [1980].) Various soil types overlie a mixture of rocks – mainly granite. On the surface there are mountains as high as 980 metres (Mount Anglem); hills and valleys; rivers, streams, lakes and pools; dune systems, extensive swamps, subalpine meadows and alpine rock formations.

It is located about 20km off the south coast of South Island, across the Foveaux Strait. (Fig. 1) Its latitude is about 47° south, longitude about 168° east, giving it a warm temperate oceanic climate, but windy and humid with no land between it and Southern Patagonia in either direction. It is quite small, although larger than the more oceanic of New Zealand's islands, being 1720sq km, 172000 hectares or 425000 acres. Its maximum dimensions are 65km (40 miles) by 40km (25 miles).

Humans have had some influence on its flora and fauna. Moa hunters appeared from the 13th C. leaving only their small and presumably inedible cousins behind – kiwis. In 1809, a seal-catching ship sailed all around and named Stewart after its first officer. Stewart Island was bought from the Maori (who called it Rakiura) in 1864, after which human despoliation increased. Opossums were introduced 1895; two different deer species in 1901 and 1905. The latter removed certain palatable plants completely from the flora. Logging was conducted in some small areas, and parts of the island have been damaged by fire. Despite all this it is still largely forested and should remain so because 85% of the island is National Park.

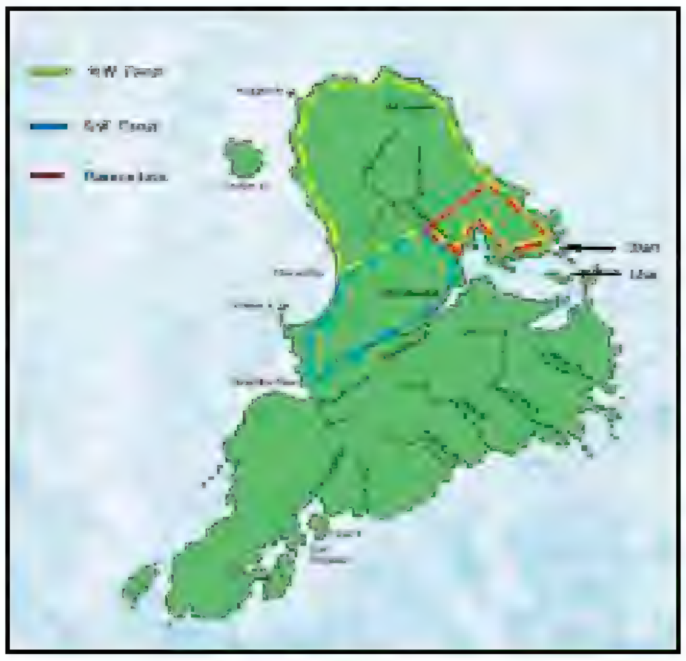

Fig. 2. Longer walking trails on Stewart Island

With a fixed population of about 450, houses take up very little space, concentrated as they are in Oban around Halfmoon Bay, nor do cars cause much pollution on the 25km of road in and around Oban. The main forms of transport are Shanks's pony and boats, which can take one quickly away from the tiny 'town'. The National Park service has provided a number of short walks and 3 long distance hikes with good well-maintained trails allowing one to get close to the ferns (Fig. 2) Apart from in the small town and on water, it is impossible not to see ferns.

Coming in by 'plane from South Island, Stewart appears to be uniformly green except on the beaches and mountain tops (Fig.3).

Fig. 3. Aerial view of green Stewart island

Most of it is thickly wooded but only with those trees which survived the last cold period of 14000 years ago or which were able to spread from nearby. Some New Zealand Gondwana trees didn't survive: *Phyllocladus alpinus*, *Libocedrus bidwillii* or *Sophora microphylla*; nor did any southern beeches. The main trees are *Dacrydium cupressinum* (Podocarpaceae) and *Weinmannia racemosa* (Cunoniaceae). Next in frequency are *Metrosideros umbellata* (Myrtaceae) and *Prumnopitys ferrugineus* (Podocarpaceae) [Wilson 1994]. All the conifers on Stewart are members of the Podocarpaceae. These trees provide a ferny forest of warm-temperate aspect.

Stewart and its encircling mini islands have a subset of about 80 of the 170+ pteridophytes of New Zealand [Wilson 1994]. With a few exceptions, they are the hardier species from the overall flora. In the few walks I did in the area around Oban, I mostly saw the same ferns everywhere.

I haven't mentioned yet one of the snags – rain, both frequent and heavy. The ferns love it but some of the walking tracks on rather peaty looking soil become quagmires with boots sinking until completely covered. Although on both visits I suffered from heavy downpours, other days I had brilliant sun with blue skies, which was somewhat disconcerting.

Fern Gully

On my first visit to Stewart in early February 2000 (before joining the BPS trip organised by Jennifer Ide) I was fortunate to be introduced to a National Park ranger who took me out to Fern Gully on my first day (Fig. 4)

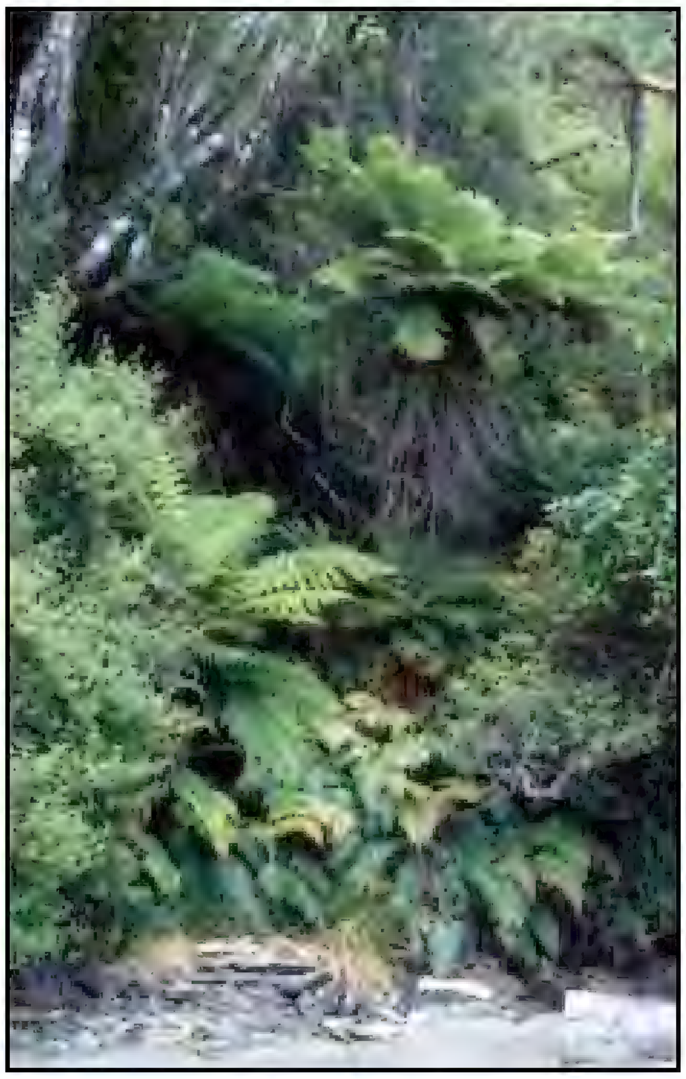

Fig. 4. Fern Gully with *Blechnum novae-zelandiae* and *Cyathea smithii*

There I saw an amazing density and variety of dripping wet filmy ferns, of which there are 18 types on Stewart. Unfortunately my friend didn't know their names and it was far too wet to take out a fern book to identify anything in situ, or to take many photographs. Certainly *Hymenophyllum flabellatum* was hanging from both tree trunks and tree ferns and I readily identified *H. ferrugineum* by its rusty appearance, due to many brown hairs (Fig.5)

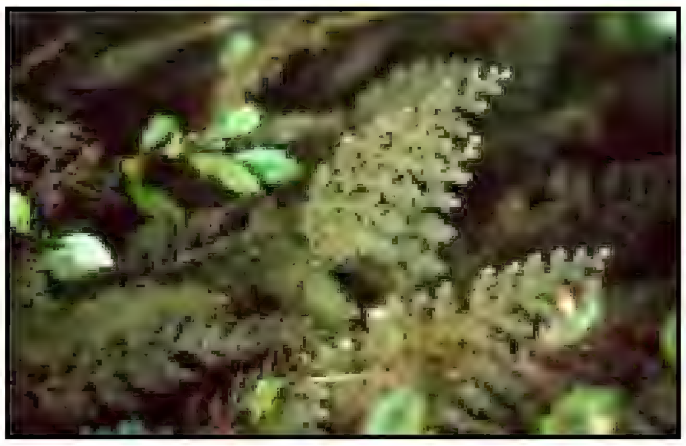

Fig. 5. Rusty looking *Hymenophyllum ferrugineum*

Having been to New Zealand in 1992 with the Alpine Garden Society I wasn't completely fazed by larger ferns (taxonomically speaking) and managed to recognise some old friends. In a nearby open spot there was a luxuriant growth of the largest blechnum of New Zealand – *B. novae-zelandiae.* I have seen it all over NZ, especially hanging from roadside banks and often with brightly coloured young yellow green fronds or, more rarely, reddish ones (Fig. 6).

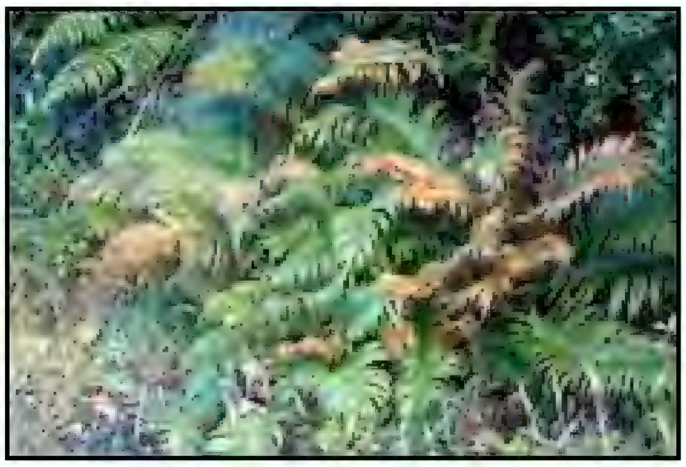

Fig. 6. The largest NZ blechnum *B. novae-zelandiae*

Growing out in the open it can sometimes appear rather coarse. Brownsey and Smith-Dodsworth [2000] describe it as intergrading with *B. minus* and *B. montanum* and hybridising with *B. procerum*. Its untidy fertile fronds, made so by a few sterile pinnae at the base, are quite different to those of *B. montanum*, which doesn't have the tapering fronds and doesn't occur here. I found that *Blechnum discolor* was very common and when present grows in great swathes. I saw the less common *B. fluviatile* in small groups as well as ubiquitous *B. penna-marina.* I was glad to find *Leptopteris superba;* this is called the Prince of Wales feathers because of its shape, which starts off as a shuttlecock but towards the tip the fronds sometimes gently curve outwards. In any case, it is very feathery and has a strong olive green colour (Fig. 7) which makes it look tougher than its pale sister fern *Leptopteris hymenophylloides* (Fig. 8) If I have any doubt about the identity of this fern, all I need to do is put my hand behind a frond. If I can see the lines and ridges on my fingers, it is this delicate fern with its very thin fronds. Both are in Osmundaceae and have spore capsules scattered on the back of the fronds.

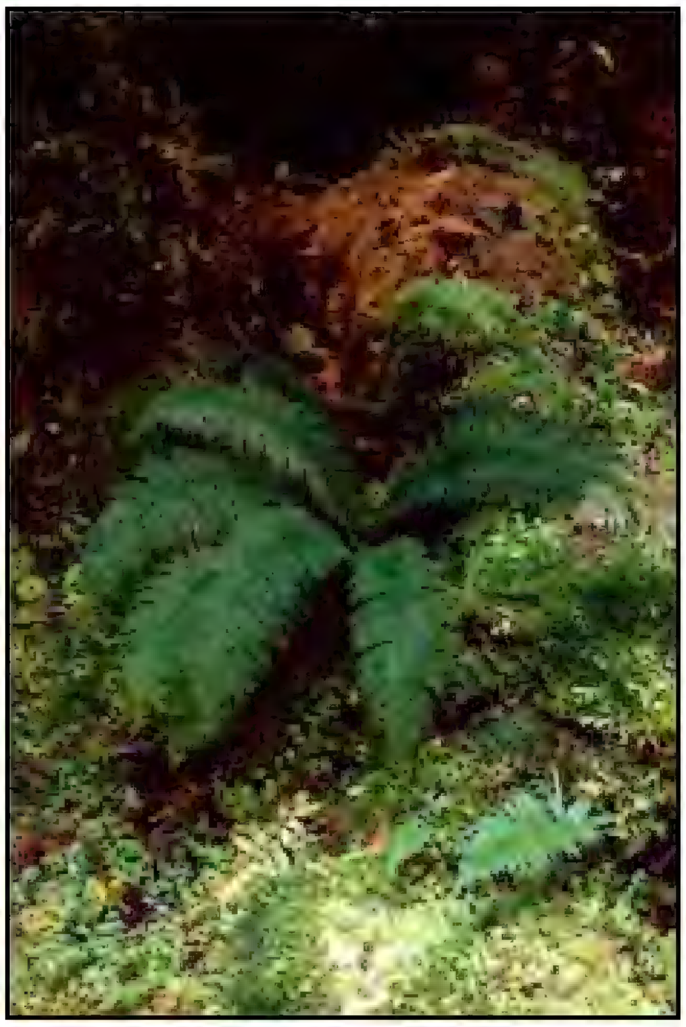

Fig. 7. Olive fronds of aptly named Prince of Wales feathers *Leptopteris superba*

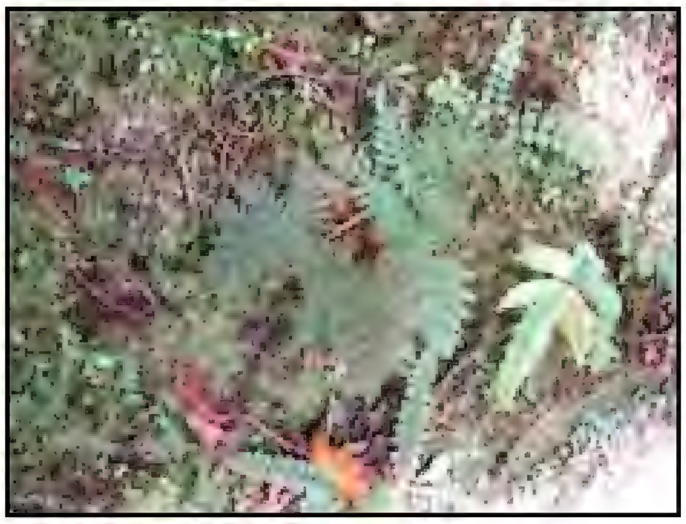

Fig. 8.Very thin fronds of *Leptopteris hymenophylloides* like a filmy fern

There are 4 tree ferns on Stewart, of which more later. Here we met *Cyathea smithii* and *Dicksonia fibrosa*. My guide Ron called the Cyathea "Cynthia Smith" (Fig. 9) with its skirt

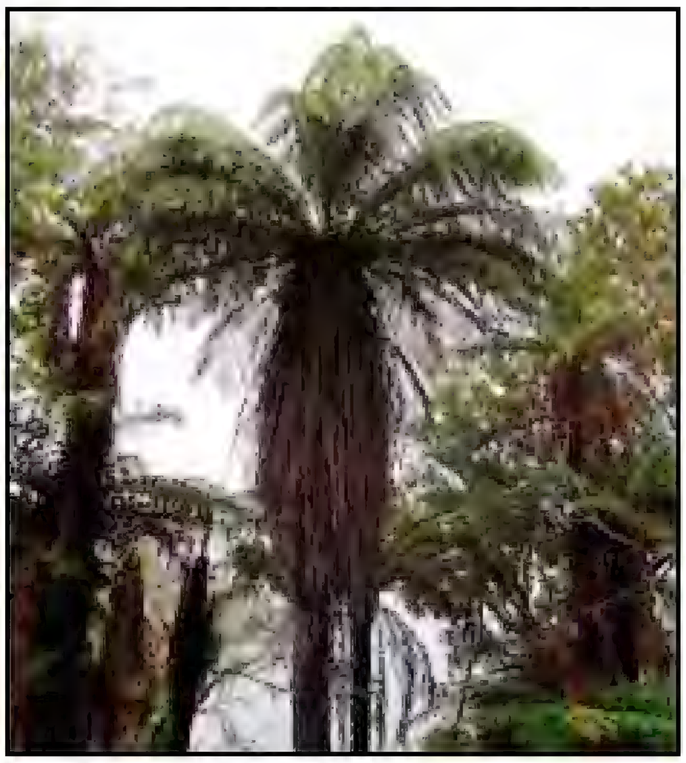

Fig. 9.*Cyathea smithii*, 'Cynthia Smith'

of dead frond stalks and *Dicksonia fibrosa* "Dirty Dick" with its heavy skirt of full fronds (Fig .10), this to encourage school children to remember their names (It worked for me too).

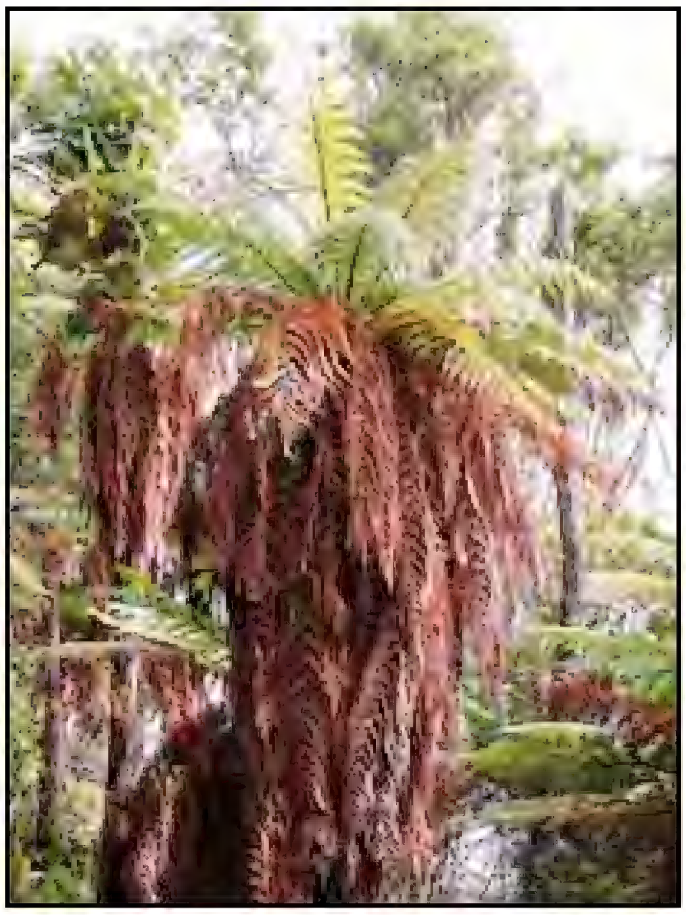

Fig. 10.*Dicksonia fibrosa*, 'Dirty Dick'

Rakiura Track anticlockwise

On my second day, I started along the Rakiura track from Oban in the counter-clockwise direction, aiming to walk outwards for half a day and back again. The entire track, which circles around just to the north of Oban, is about 30km, taking 2-3 days of hiking. On the way along the road I went past appropriately named Horseshoe Bay and some inlets to get to the official starting point in Lee Bay, which had a fine view from the beach ahead to the well wooded ridges flowing down to the sea (Fig. 11).

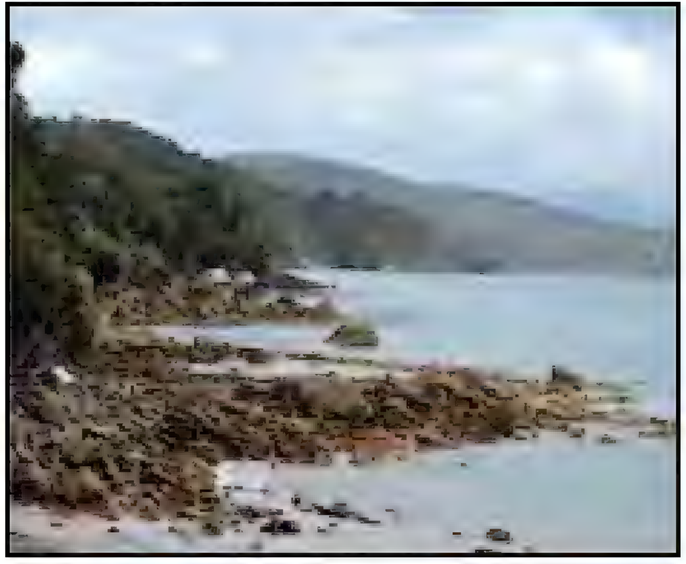

Fig. 11. Coast near start of Rakiura track

Close to the beach the ground was thickly covered in large shrubs, many with large shiny leaves that glinted in the sun. Sometimes referred to as mutton bird scrub, or simply muttonwood, *Senecio reinoldii* is a striking member of this whole assemblage also called mutton bush scrub.(Fig.12)

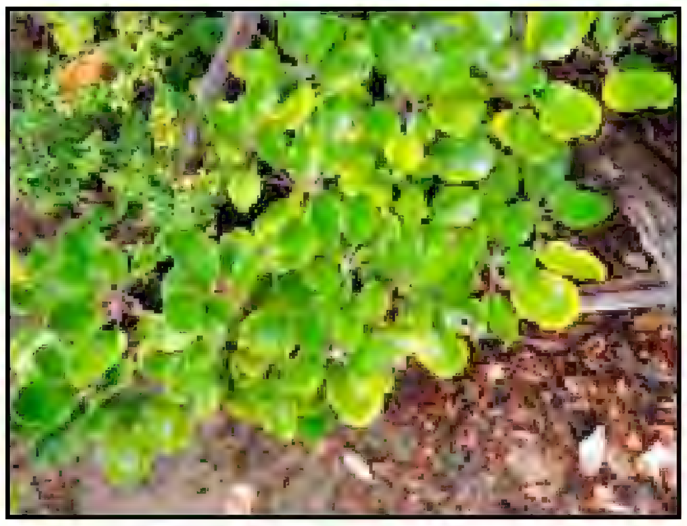

Fig. 12. Mutton bush scrub

The hiking track is clear with the surface varying from stony track to wooden board walks, to steep stone staircases or part wooden stairs (Fig. 13).

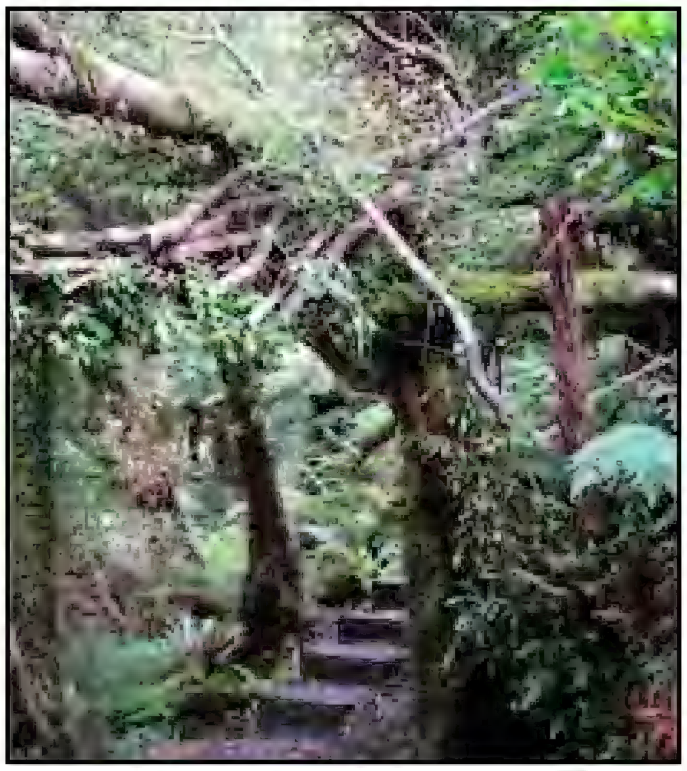

Fig. 13. Rakiura track steps

For the entire walk I was surrounded by ferns and trees except where there were tantalising views of the sea or when crossing a river bed. Quite often there was a drop to the sea on my right, usually with quite a few plants before plunging downwards, and to my left a slope upwards from the cut bank; this was where I saw most of the smaller ferns (Fig. 14).

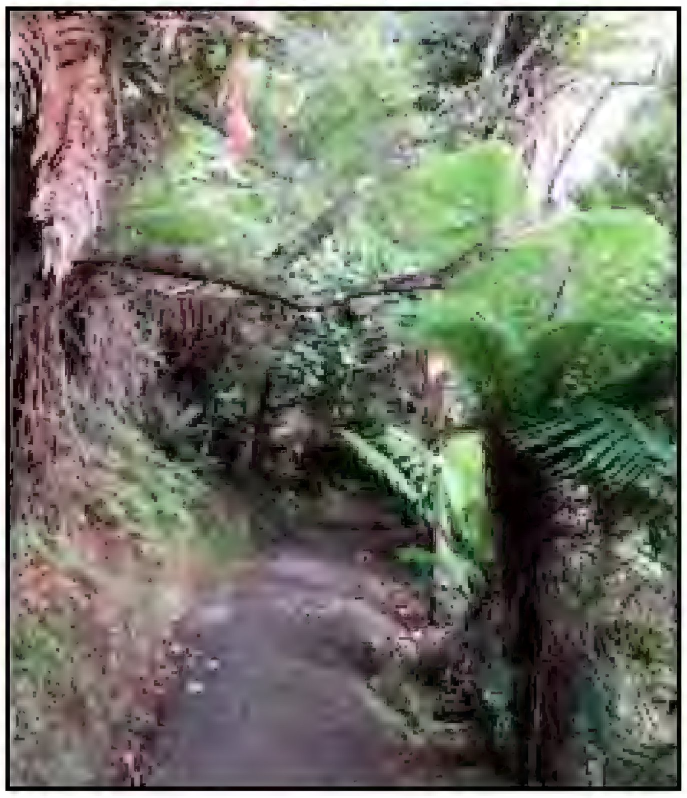

Fig. 14. Rakiura track, steep hill on left, drop to sea on the right

Sometimes the path cuts inland for some distance to cross ridges, cutting off the sea view. In these thickly wooded parts, we were mostly surrounded by small trees with thin grey trunks marked by darker patches and reminiscent of birches (Fig. 15) and there were occasionally young trees of *Dacrydium cupressinum* with weeping branches next to older ones with their distinctive splitting bark.

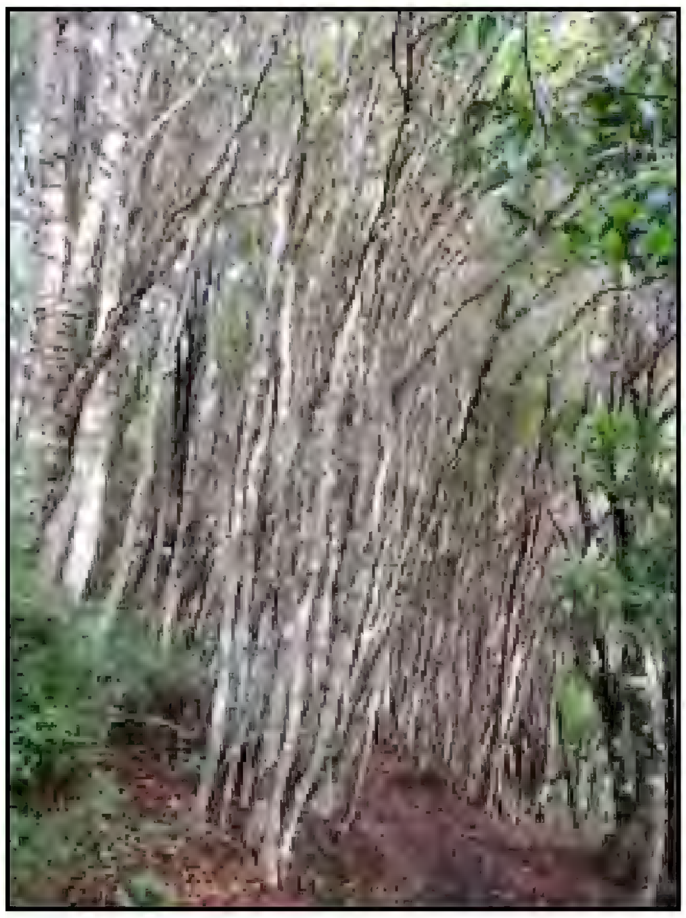

Fig. 15. Rakiura track amongst birch-like trunks

After puffing up and down the various ridges, it was a pleasant surprise to stomp down some steep steps to a wide river bed and a beach either side of the river as it touches the sea. For high tides or high rivers, there is a long wooden bridge across the river that had, strangely, a sewage smell. Pottering amongst the mutton wood bushes and rocks behind the beach I was thrilled to find *Asplenium obtusatum* (Fig. 16) with its stiff shining leathery fronds.

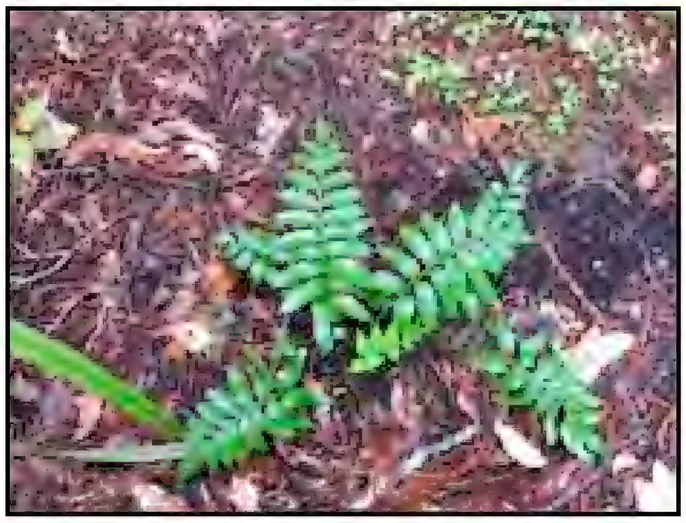

Fig. 16. *Asplenium obtusatum* with stiff shiny fronds

In all of New Zealand, I never found it far from a sea shore. At home, it grows well in pots but I have to over-winter them in the greenhouse. I left one pot out as an experiment one winter; it looked perky until the spring when all the fronds suddenly went black. The only other fern with which it could be confused is *A.oblongifolium*, which does not occur on Stewart, although I found plenty of ferns which looked very much like it.

My goal was to reach Maori Bay, but by the time I had eaten my lunch by the river, I had really only enough time to get back to my B&B, change and walk to the one and only restaurant for an evening meal. That day about half a dozen hikers overtook me in the morning but otherwise I was alone without a mobile phone therefore I remained slightly worried about the possibility of an accident. On other walks I saw no-one at all. On my second visit in 2015, I had a companion and our landlady was primed to expect us back at the start of the trail by a certain time, a more comfortable situation.

On that second anticlockwise walk in 2015, we nearly reached Maori Bay before we were forced to reverse. Looking back to the ferns seen in 2000 compared with the more recent trip, I added some species to my list. I ignored swathes of *B. novae-zelandiae* (Fig. 17), bracken, *Polystichum vestitum* and sad-looking dead *Dicksonia squarrosa* trunks in the open at the start of the walk, which quickly became more interesting. To my left on the rising slope I found great patches of *Phymatosorus diversifolius*, or of *B. fluviatile* (Fig 17) with an occasional plant of *B. durum*. Almost rosette-like, especially when well spaced out, plants of *B. fluviatile* have splayed linear fronds and are quite neat, their central fertile fronds being vertical in contrast and both have many pinnae. Although I have rarely seen *B. durum* , I love this neat small fern with its dark green fleshy sterile fronds and shorter fertile ones (Fig. 19)).

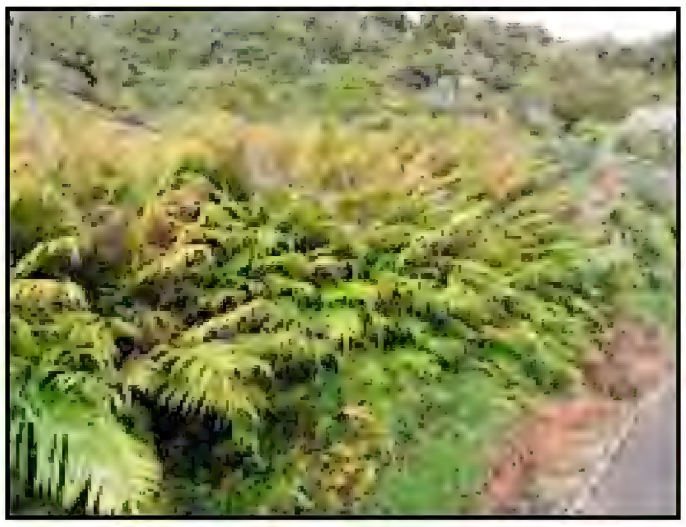

Fig. 17.*Blechnum novae-zelandiae* looking fresh and bright in the sun

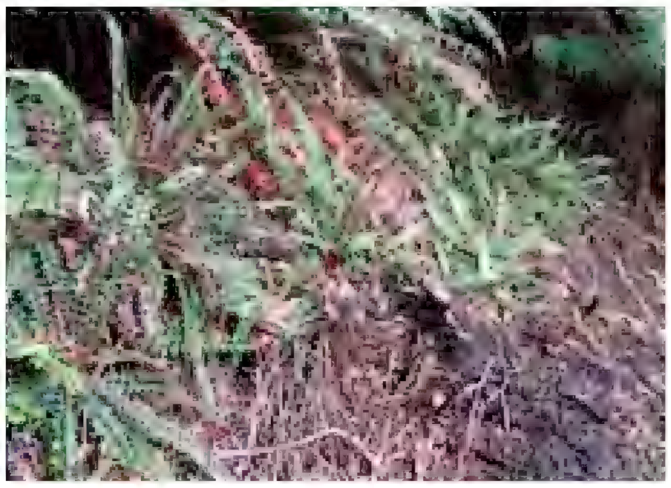

Fig. 18.*Blechnum fluviatile* with fertile fronds

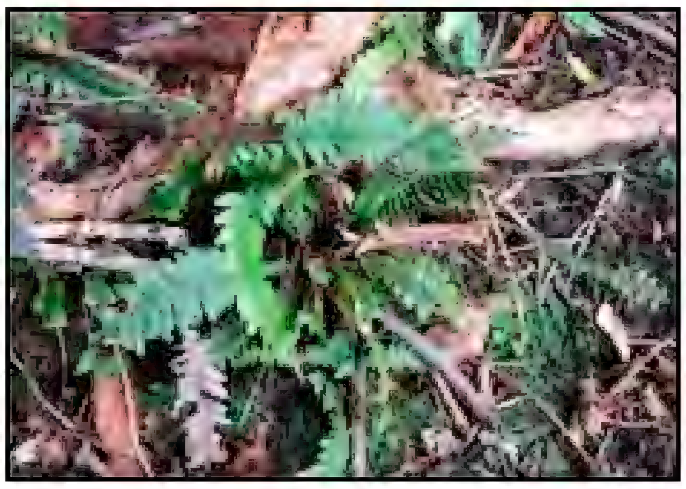

Fig. 19. Dark green fleshy fronds of *Blechnum durum*

It is said to be mostly coastal and often associates therefore with *A.obtusatum* and *B. blechnoides* (previously *B. banksii*). *Blechnum discolor* with its rather ragged fertile fronds formed large patches as did fertile plants of the much smaller *B. procerum*. *B. chambersii* was either less frequent or not recognised by me. On my right were clumps of *D. squarrosa* (Fig. 20).

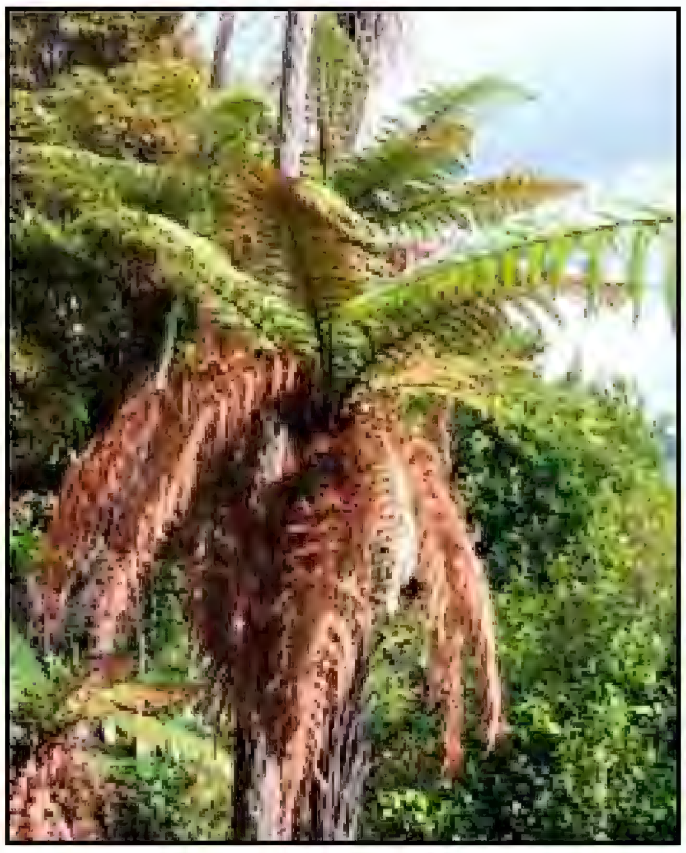

Fig. 20. *Dicksonia squarrosa* with mostly bare trunk

Irritatingly for purposes of identification, it can also retain entire dead fronds, but far fewer and only higher up the trunk than *D. fibrosa,* leaving most of it as bare spiny frond bases. *D.squarrosa* has similar black frond ribs (Fig. 21) to *C. medullaris,* which also grows on Stewart (Fig. 22*)*. Here and there were individual plants of *Dicksonia fibrosa* with its heavy skirt, or *C. smithii* with its light skirt. The tree ferns certainly made their presence felt in other ways - sometimes providing a tunnel to walk through as well as covering the ground in some places with baby tree ferns which were interspersed with the more common blechnums.

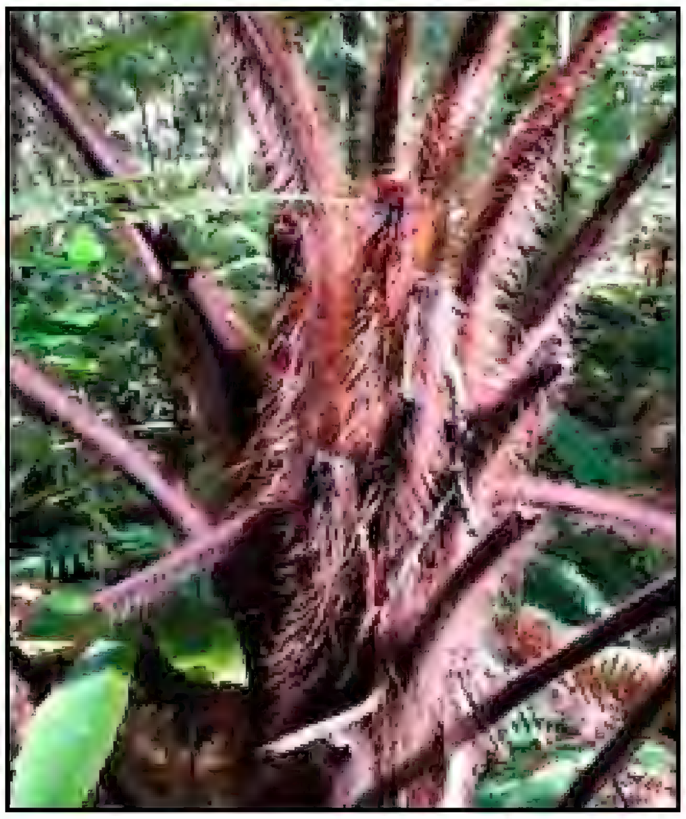

Fig. 21. Black frond bases of *Dicksonia squarrosa*

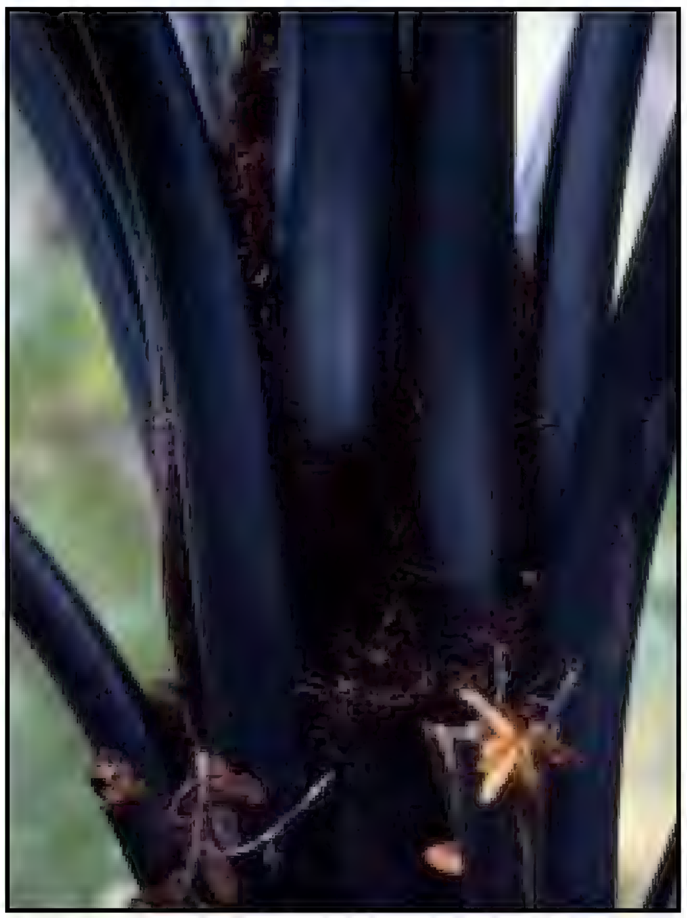

Fig. 22. Black frond bases of *Cyathea medullaris*

Some ferns appeared only occasionally: the one maidenhair fern *Adiantum cunninghamii* (Fig. 23), *Paesia scaberula*, *Leptopteris*

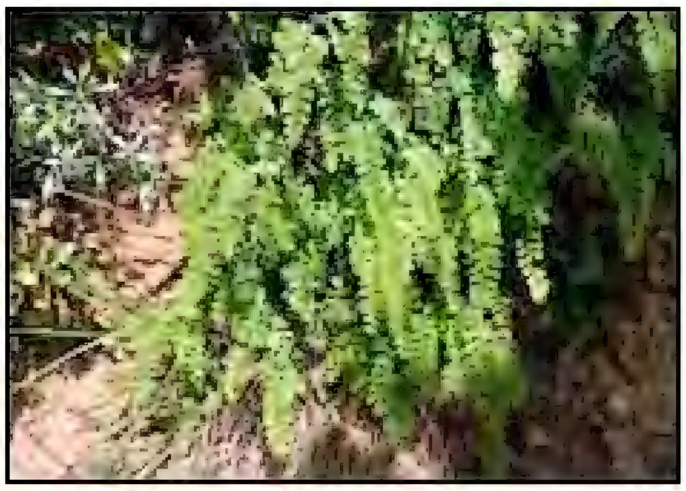

Fig. 23.*Adiantum cunninghamii*

hymenophylloides, *Rumohra adiantiformis*, and my much-loved *Histiopteris incisa* (see Top ten ferns of Tasmania in last year's Pteridologist). *P. scaberula* has bracken like tendencies, is very tough, easy to grow from spores and difficult to kill in cultivation. It doesn't add much aesthetically to the fern flora here. Infrequent plants of *Asplenium flaccidum*, *A. scleroprium*, *A. polyodon*, *A. bulbiferum* I shall discuss below. I am not aware of having seen *Asplenium lyalli* outside a flower pot but looking again at images, I might have seen small versions of it.

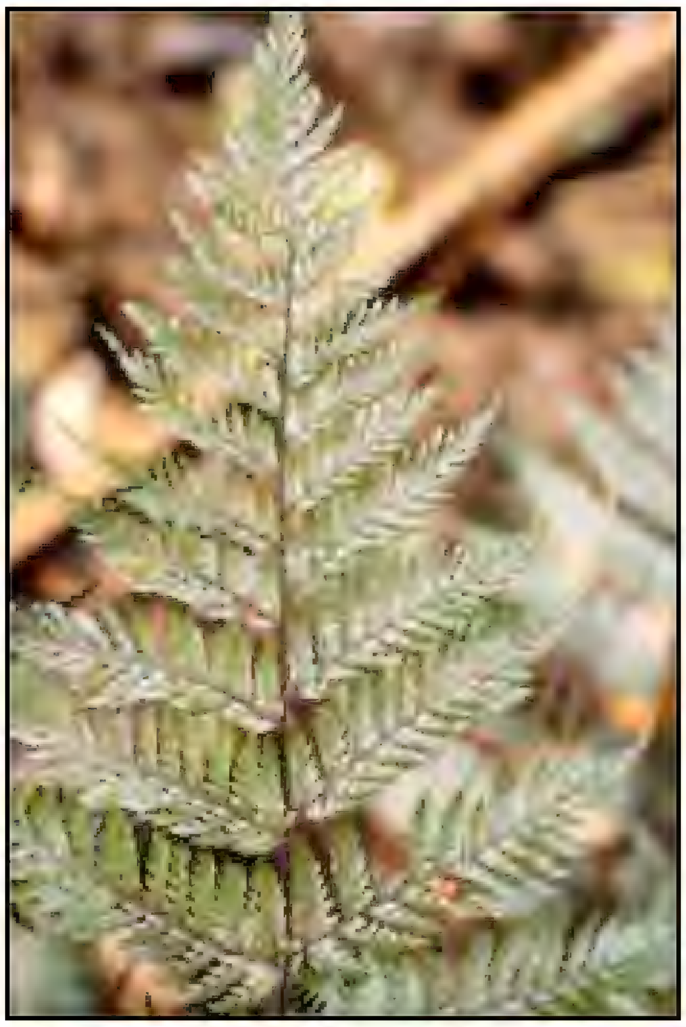

Fig. 24. *Leptolepia novae-zelandiae* with delicate feathery fronds

Leptolepia novae-zelandiae (Fig 24) is an old favourite from my 1992 trip and I have grown it from spores subsequently. I like its colouring - silvery grey green frond with mauve midribs of primary pinnae and its delicate feathery tri-pinnate fronds. Although not frequent, I found the same grammitis everywhere, almost certainly the most common *G. billardierei* with quite long fronds (pen length) both on the ground and on tree trunks. (Fig. 25)

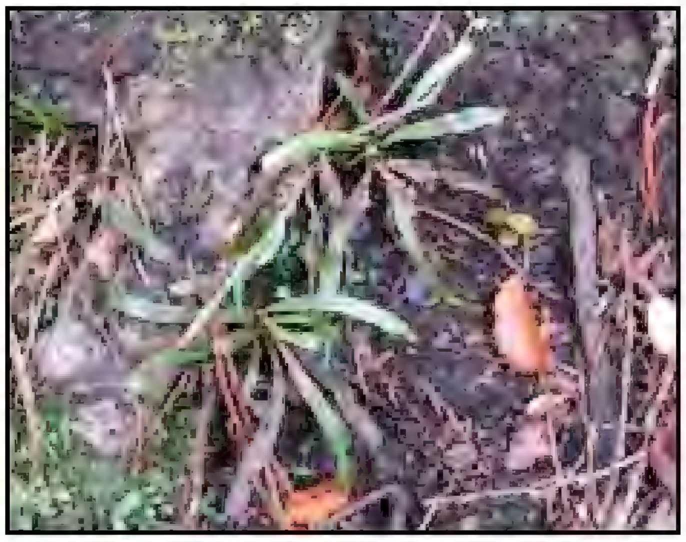

Fig. 25. Probably *Grammitis billardierei*

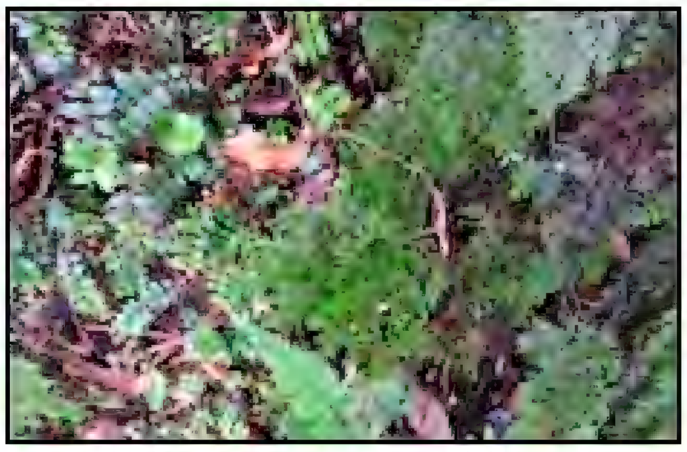

Fig. 26. *Hymenophyllum sanguinolentum* has black stipes and a strange smell

As for the filmy ferns, I identified *Hymenophyllum sanguinolentum* (Fig 26) with its black stipes and strange smell. *H. dilatatum* (Fig 27) has broadly winged rachises and is usually epiphytic.

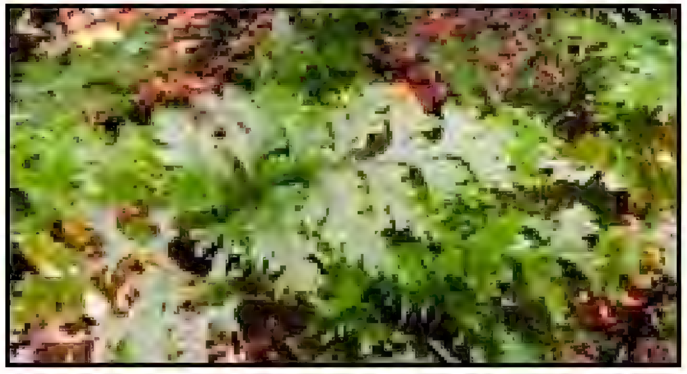

Fig. 27. *Hymenophyllum* dilatatum with broadly winged rachises

Used to seeing upright and fallen tree trunks covered in filmy ferns, I was rather dumbfounded to see so many patches of ground covered in a mixture of these two filmies with other unidentified ones, dotted about with grammitis (Fig. 28).

Fig. 28. Ground cover of filmy ferns

The steeper banks and large fallen trees produced green waterfalls of filmy ferns glorious to my eyes after seeing the dried-up specimens on North Island and the north of South Island a few weeks earlier. These 'waterfalls' mainly featured *H. flabellatum* (Fig. 29), which I described in Top ten ferns of Tasmania [2016].

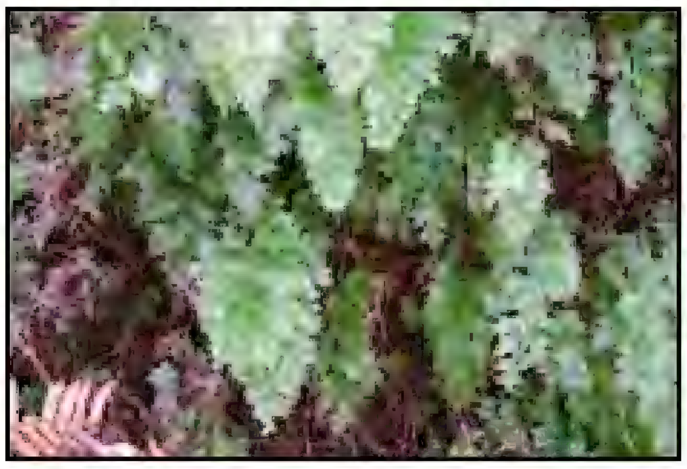

Fig. 29. *H.flabellatum* with fan like pinnae

I have one photo of *Lindsaea trichomanoides* (Fig. 20) which is so hard to find unless my nose is almost on the ground. Tiny and delicate as it is, I would love to grow if from spore but I think it has short-lived spores and is therefore rather difficult.

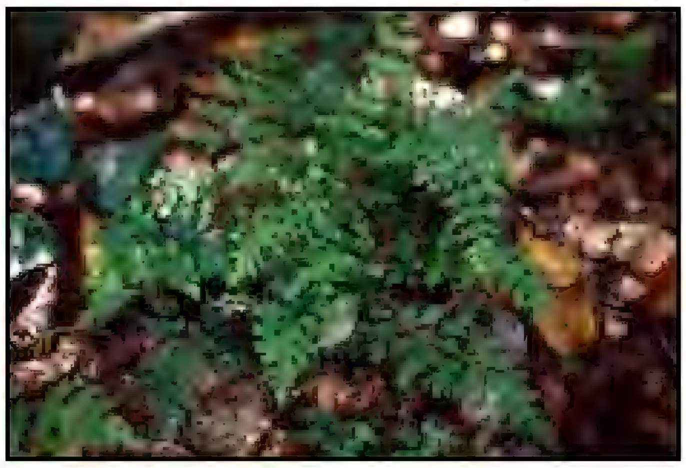

Fig. 30. Tiny delicate *Lindsaea trichomaniodes*

Amongst the other epiphytes were many of the ferns mentioned earlier plus *Ctenopteris heterophylla* (Fig. 31) which has leathery pinnate fronds and *Pyrrosia eleagnifolia* with its very unfern-like leathery simple fronds. Its frond backs are covered in fluff that tantalisingly hides sporangia, which never seem to be ripe (Fig.32). Both the latter are in Grammitidaceae, have unprotected sori and can hybridise.

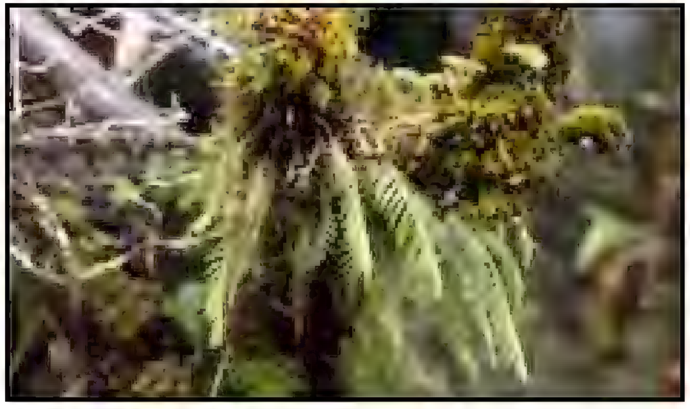

Fig. 31. *Ctenopteris heterophylla* with leathery pinnate fronds

I saw very few lycopods; the only one I remember is the plant I squashed when I sat on a bank to eat my lunch. It was either that or squash more delicate true ferns so thickly covered was the ground.

Continued on page 458

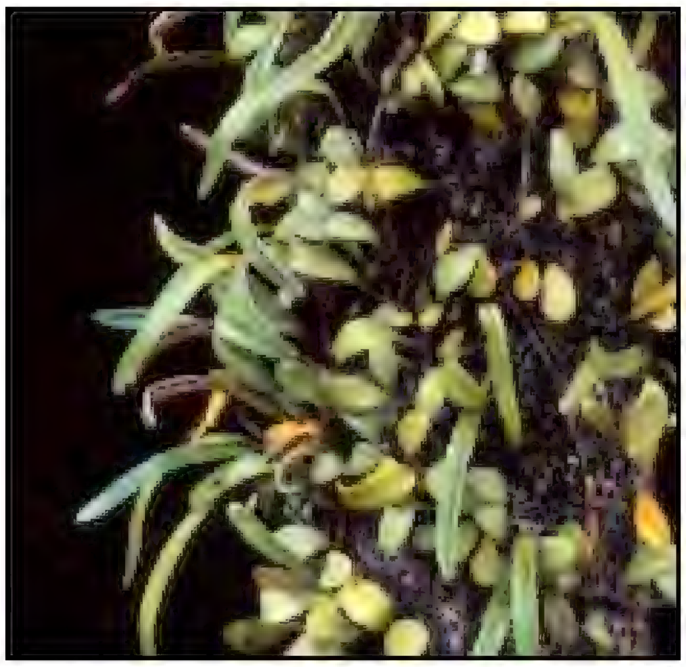

Fig. 32. *Pyrrosia eleagnifolia* with sori

Would the Real ‘*Plumosum Druery*’ Step Forward Please!

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Mr. John Trott, a farmer and tenant of the Rev. Z. Edwards, found a beautiful plumose Athyrium in 1863, not far from Axminster in Devon. If you are not familiar with *Athyrium filix-femina* ‘*Plumosum Axminster,*’ it is an attractive, feathery but un-crested lady fern that mostly comes quite true from spore; however, it also produces bulbils on the undersides of the fronds; this was, at the time, a completely new development in lady ferns. There was great excitement over this new and interesting fern; it was propagated extensively and made it into all the very best collections of the day.

Many years after Mr Trott’s discovery, a cultivar was eventually bred from Axminster spore by Mr. Parsons that was an improvement on the parent, being much more finely cut than Axminster; this was named *A.f.f.* ‘P*lumosum Elegans Parsons.*’ Like its parent, this cultivar didn’t have cresting of any kind but it did produce bulbils.

Charles T. Druery had taken keen an interest in bulbil production on lady ferns and was corresponding with a number of other keen enthusiasts on the subject. In 1883 it was Druery who discovered bulbils on *A.f.f.* ‘*Plumosum Divaricatum*’*;* this was another wild plumose discovery that had been found in Lancashire in 1872 by W. Morris, who was a keen fern collector. After this discovery Druery began to get something of a reputation when it came to bulbils, particularly those on Athyriums. It was this reputation that was ultimately to lead to the breeding of the ‘superbum’ range of plumose Athyriums, and to his discovery of apospory in *A.f.f.* ‘*Clarissima Jones*’, which really is a whole other article in itself; I won’t go into it here.

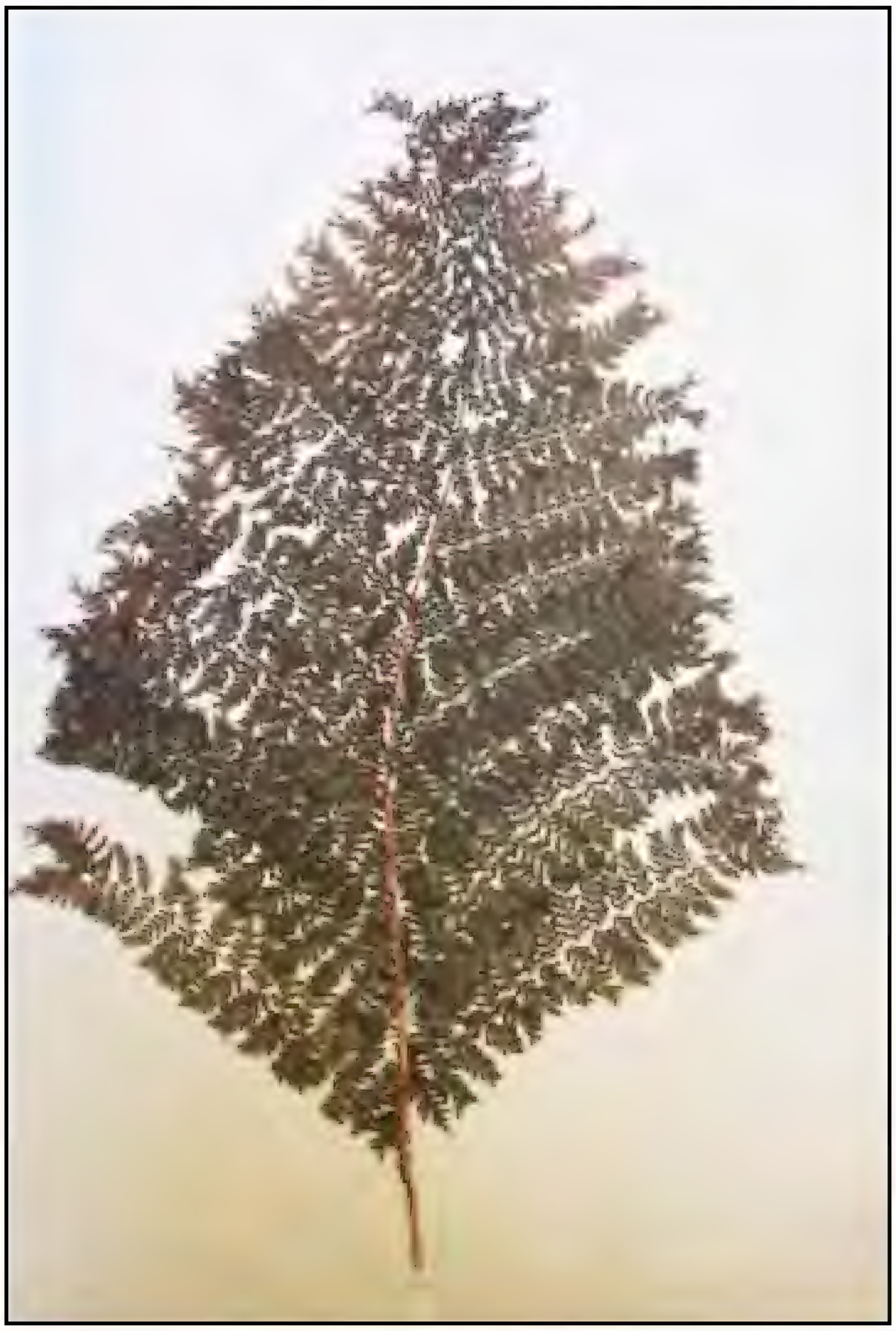

Fig. 1. ‘*Plumosum Superbum Druery*’
Photograph taken before accessioning to RHS Wisley

Mr. J.H. Fitt of Welwyn was one of those enthusiasts who were corresponding with Druery on the subject of bulbiferous ferns, and it was he who discovered bulbils on his plant of *A.f.f.* ‘*Plumosum Elegans Parsons*’; he decided to send a pinna to Mr. Druery to show that it too produced bulbils. After examining this specimen, Druery noticed that not only were there bulbils on the pinna, there was also some spore, which he decided to sow. At about the same time Mr. Fitt also sowed spores from his plant of ‘*Plumosum Elegans Parsons.*’ Both of these sowings gave sporelings that were not only plumose but almost all heavily crested, which surprised both gentlemen as both parent and grandparent didn’t carry any cresting whatsoever. Unfortunately the sowing made by Mr. Fitt did not contain any superior fern cultivars and so were discarded.

In Mr. Druery’s sowing, two of the one hundred or so sporelings were described as showing the characteristics of ‘*Elegans,*’ the remainder were crested as well as plumose. Of these, all but a further two showed deformities of one form or another; many had shortened or missing pinnules or were described as being depauperate in some way. Of the two which weren’t deformed, one stood out, being much finer than the other, and so he grew this one on, eventually calling it ‘*Plumosum Superbum Druery.*’ It proved to be a magnificently crested plumose cultivar, which was quadripinnate (four times divided) with most of the pinnules being percristate.

In its second year (1887), ‘*Plumosum Superbum Druery*’ (see Fig. 1.) had produced a little spore, which Druery decided to sow; this yielded 120 plants, all of which were exceptional in beauty and dissection of the fronds. Of these there were two distinct types: crested or non-crested, but there was much variation and no two ferns were the same. One was an extreme percristate, with even the pinnulets (divisions on the pinnules) being crested. It turned out to be a particularly fine and unusual plumosum; a photograph of a frond, probably from this fern, appears on page 115 of Druery’s book *British Ferns and Their Varieties*. This fern was not as vigorous as its parent, only growing to about two feet tall; however, it was quadripinnate like its parent and instead of the fronds being broadly lanceolate, as Athyriums usually are, *A.f.f.* ‘*Plumosum Superbum Percristatum Druery*’ (Fig. 2.) resembled more the shape of a dinner plate.

Subsequent sowings made from ‘*Plumosum Superbum Druery*’ gave mediocre progeny, which led Druery to write in November 1901 “*We have, therefore, in this fact, and also in the subsequent refusal of superbum to yield a similar* *diverse breed to the first, some evidence that a tendency to vary may exist in a fern at one season, and be absent at another, and it is also clear that with such diversity originating under identical conditions, the variation cannot be regarded as in any way a response to or sympathy with the environments, but is so to speak, indiscriminate in all directions”.*

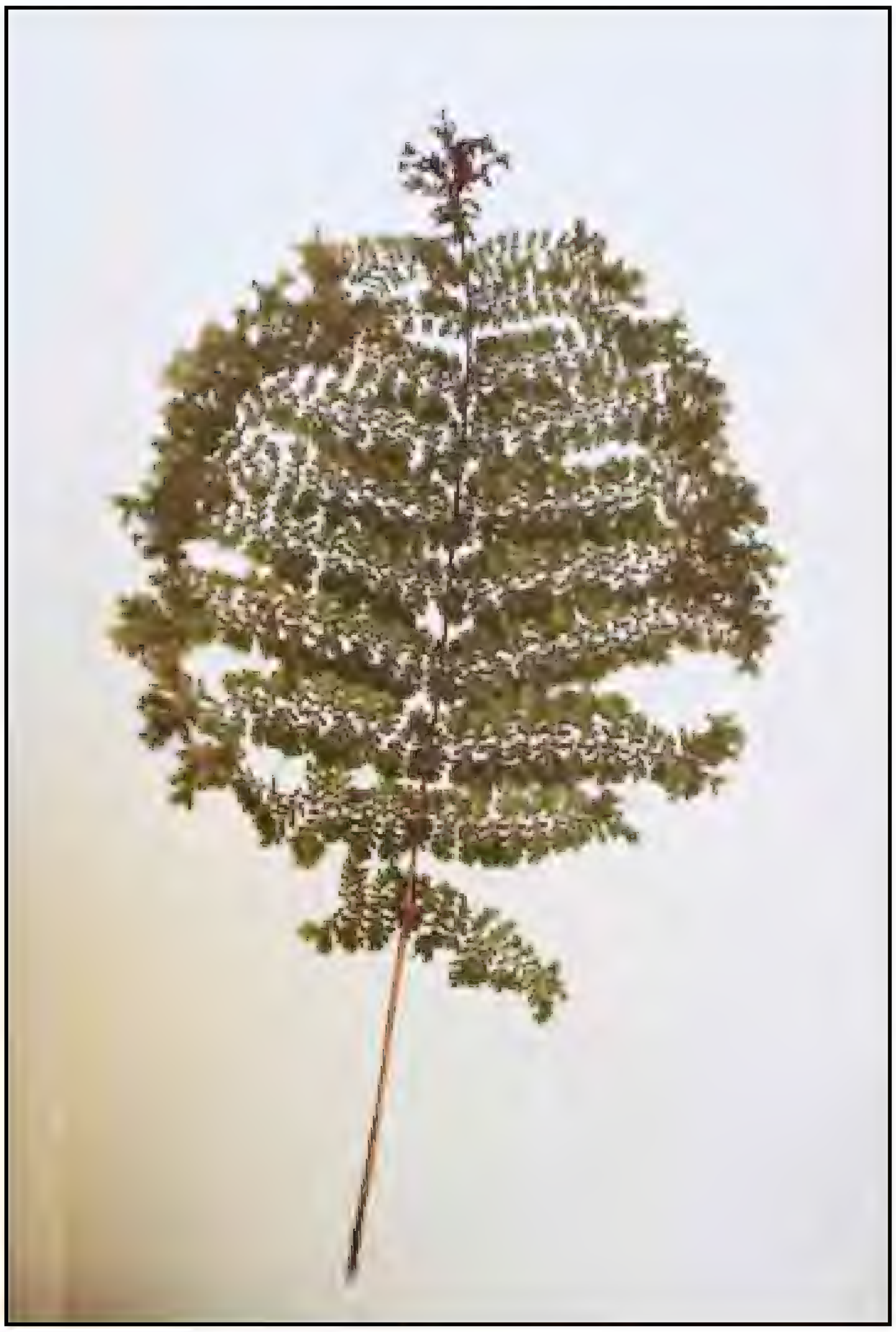

Fig. 2. One of Druery’s *‘percristate superbums*’
Photograph taken before accessioning to RHS Wisley

To illustrate the many plumose treasures he had bred, Druery published a list in the very first edition of the BPS Fern Gazette, as he was the editor at the time (Fig. 3.). It lists some of the cultivars acquired from this sowing although this is not a comprehensive list; not listed is *A.f.f.* ‘*Plumosum Superbum crispatum*’ and *A.f.f.* ‘*Plumosum Cristatum Druery,*’ A cultivar also not listed was ‘*Plumosm Superbum Densum,*’ which Druery said was one of his “happiest acquisitions” from the sowing.

Specialities Raised

A f.f. plumosum superbum Druery. Raised from spores of *A f.f. plumosum elegans parsons*, raised from *Axminster plumosum*, wild find, fronds very plumose and finaly crested, although parent quite devoid of crest.

A. f.f. plumosum Druery. Raised from *A f.f. p. superbum Druery*, a magnificent fern; nothing to compare with it.

A. f.f. plumosum superbum percristatum Druery.	All sister plants to the last i.e. from same batch of spores; all crested to third or fourth degree
A. f.f. kalon - - - - - - - - - - -	
A. f.f. grandiceps - - - - - - -	
A. f.f. dissectum - - - - - - - -	Same batch, but uncrested
A. f.f. foliosum - - - - - - - - -	
A. f.f. plumosissimum - - - -	

There are some half-dozen others of equal merit but unnamed, the whole batch being most remarkable and forming an easily recognisable section even in their offspring, of which a great number have been raised from spores and bulbils which some of them produce on the fronds in conjunction with the spores. This is inherited from the Axminster progenitor.

Fig. 3. Specialities raised by Druery

In the non-crested young ferns there was one which stood out from all the rest; this was potted up and looked after, and it eventually grew into a magnificent plumose Athyrium. This fern was unequalled by any other plumose cultivar and Druery named it ‘*Plumosum Druery.*’ Druery tells us that, under protection, it could grow to five feet (1m 52cm) in height and as much or more in width, with individual fronds growing to nearly 2 feet (60cm) wide and pinnae attaining 5 inches (12.7cm) in width. Plants grown without the benefit of protection did not attain these dimensions, and this could account for some of the other descriptions given of the fern. Jimmy Dyce commented in an article in the 1978 Pteridologist “*I feel there was some exaggeration! Druery did tend to become over-enthusiastic at times over pet plants.*” It was however, without doubt an exceptional plumose fern, being remarkably quinquepinnate or five times divided. (Fig. 4.) Others from this non-crested section were ‘*Dissectum*’ and ‘*plumosissimum,*’ but Druery

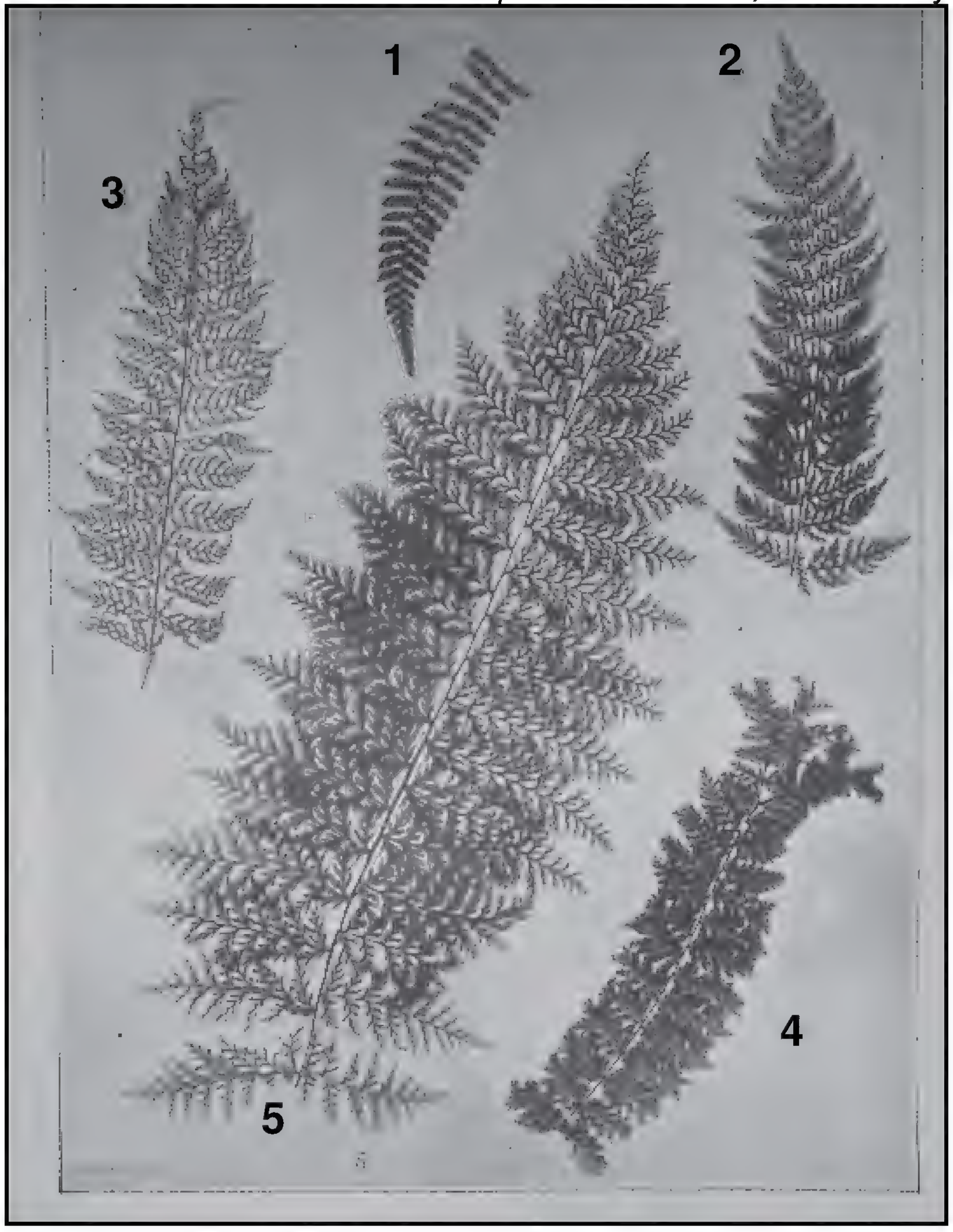

Fig. 4. Evolution of *A. f.f. Plumosum Druery*
1. Normal frond 2. *A. f.f. plumosum Axminster* 3. *A. f.f. plumosum elegans* 4. *A. f.f. plumosum superbum*. 5. *A. f.f. plumosum Druery*

considered these to be reversions back to the Axminster type; they were more finely cut than ‘*Plumosum Elegans Parsons.*’

‘*Plumosum Druery*’ took the fern world by storm and so popular did it become that it became known as ‘P.D.’ amongst its devotees. Superb specimens of both ‘P.D.’ and ‘*Plumosum Superbum Percristatum Druery*’ were presented to Queen Victoria at Windsor Castle and graciously accepted by Her Majesty. (It is exciting to speculate that these plants could still be growing at Windsor; however, around one hundred and thirty years have passed since these plants were given to the queen and in that time many things could have happened to them. We have been through a number of periods when ferns became unfashionable, when they could have been grubbed up and thrown out.) In 1891 ‘P.D.’ was awarded a first class certificate by the Royal Horticultural Society and the following year it was given best fern in show.

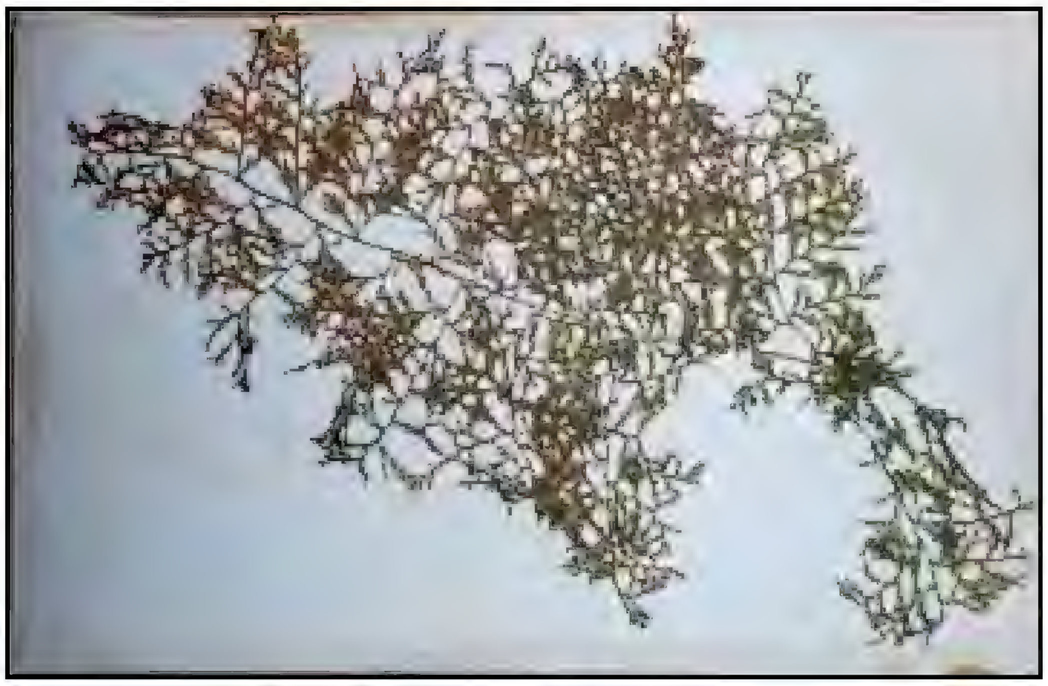

Fig. 5. A frond of a fern groiwn from a bulbil of *Plumosum Druery*

Like its parent and grandparent ‘P.D.’ not only produced spore but also bulbils; some seasons the backs of the fronds were said to be “*covered*” with bulbils, although Druery really struggled to get these bulbils to grow through the winter. He writes in the BPS Fern Gazette “*These bulbils yield quite true replicas of the immediate parent, but only on a few occasions have they succeeded in surviving the winter, since, of course, they are terribly handicapped by the fact that the fronds bearing them are quite deciduous, dying down in the autumn, and thus depriving them of support.*” He only succeeded in getting the bulbils to grow by layering the portions of the fronds nearest the soil. He did this in early autumn and only then with ‘close cultivation,’ Victorian- & Edwardian-speak for growing under glass – in this case it is likely to be either a glass ‘slip’ (small square of glass) placed over a seed tray, or a bell jar or similar. A recent visit to the BPS archive turned up a frond of a fern grown from a bulbil of P.D. (Fig 5.) - it looks nothing like P.D. or any other Athyrium seen since but there is no way of knowing whether this was one of the few grown by Druery himself, or by some other P.D. enthusiast. Sowing the spores that P.D. produced gave rise to uncrested plumose seedlings which resembled P.D.

Where are these magnificent cultivars now, which so excited the Victorian and Edwardian fern world? It is not known how prolific ‘P.D.’ and the ‘superbum’ range were at producing extra crowns, but with all the excitement surrounding these cultivars at the time, it would seem likely that producing enough divisions to cope with demand would have been a real problem; couple this with all but ‘P.D.’ having names ending in ‘*Superbum Druery,*’ the situation is just perfect for confusion and mix up. Mix-ups happen on commercial nurseries and seed houses where similar cultivars or names are being produced; great efforts are made by professional horticulturalists to prevent this or rectify it once it has happened. Remember the ferns we are discussing here are mainly in the hands of amateur fern enthusiasts distributed across the country, although some were on commercial fern nurseries.

If demand for P.D. was so great and it was possible to produce similar ferns to P.D. from spore then it is quite feasible that the nurseries of the day would have done so. This then creates two problems – although these spore raised plants may look like P.D. they cannot be genetically identical to P.D. as both male and female have contributed to their makeup at the prothalli stage; only ferns derived from division, bulbils, or possibly even frond bases, could be genetically identical. We are now looking at these cultivars over one hundred years after their breeding so the second problem is how on earth do you tell what is P.D. or what is a descendant of a spore raised plant, or even if the fern has had its label mixed up in an old garden or on a fern nursery?

Photographs taken at an old fern nursery I used to visit many years ago, sadly now no longer in business, illustrate this point. In one photograph there is a label next to a fern which reads *A.f.f.* ‘*Plumosum Druery*’, which you would imagine would be a cause for great joy, but the fern it stands next to looks more like a type of ‘*Plumosum Divaricatum*’ than the image shown in Fig. 4. There have been a number of plants or herbarium specimens labelled as ‘*Plumosum Druery,*’ which really ought to be considered as types of ‘*Plumosum Divaricatum.*’ Observe how much light shows through the pinnules in Figure 4, although keep in mind this specimen would have been grown under glass.

Thanks to the efforts of Julian Reed, who has spent a great deal of time going through the herbarium specimens at Wisley, we now have photographs of the original fronds that appear in Druery’s books (Figs. 1 & 2). Both ‘*Plumosum Percristatum Druery*’ and ‘*Plumosum Superbum Druery*’ were presumably photographed when fresh and then were pressed in a herbarium. These are particularly useful in identifying these old cultivars should they ever be tracked down, but alas a herbarium specimen for the ‘P.D.’ that appears on page 112 of Druery’s ‘*British Ferns and Their varieties*’ has not yet been located, so we must continue to use the old photographs to identify potential candidates. Incidentally, the ‘P.D.’ in the pot on the lower half of page 112 was the actual plant given to the Queen. A great deal of effort has gone into locating Druery’s treasures over the years and credit goes to a number of members of the BPS Cultivar Group who are continuing this search.

A likely candidate was discovered in 2015 by members of the Cultivar Group which not only closely resembles ‘*Plumosum Druery’* but has potential pedigree and lineage (Fig. 7.). The plant originated from the collection of Messer’s Bolton Bros. of Warton near Carnforth, Lancashire which in its day was one of the leading fern collections in the country.

Would the Real ‘*Plumosum Druery*’ Step Forward Please!

This fern was part of a much larger collection which had been handed down from Robert Bolton and passed to Charles Lord after Charles had married his daughter Annie. In time Charles & Annie’s son, Jim inherited this collection, and it was he who looked after the ferns until his death, when Jim’s widow Olwyn sold off much of the collection to a fern nursery.

Jim had always prized his ‘*Plumosum Druery*’ and given strict instructions that this fern should be “looked after and treasured.” Olwyn was approached by the Cultivar Group, and after they visited her at her home in Skipton, she gave permission for her fern to be lifted and divided; the divisions that were obtained were distributed amongst the several members who had tracked this plant down.

The benefit here of course is that this cultivar is now no longer just in one garden where a pest attack or drought could have meant the cultivar was lost for good; whereas now it is in several gardens and a division from another collection could be divided to replace one that struggles to establish.

It is conceivable that these ferns could have survived somewhere; they were certainly in enough collections up and down the land, and there are other cultivars that have survived from around the same period or from further back in time. *A.f.f.* ‘*Axminster*’ is still in gardens but there are several clones of it, and which one is the original is open to discussion; ‘*Acrocladon*’ was found in Yorkshire in 1860 and has recently reappeared. The two *A.f.f.* ‘*Clarissimas*’ are still with us – ‘Jones’ was found near Ilfracombe in 1860 and ‘Bolton’ was found in Lancashire in 1893. So if you have the ‘real’ ‘*Plumosum Druery*’ or any of the others from the ‘*superbum*’ range, be sure to let me know.

What about other herbarium specimens – surely someone must have pressed ‘P.D.’ for posterity? Until recently they have proved elusive, but there is one un-named herbarium specimen (Fig. 6.) that is very similar to a fern frond which appears in an old photograph in the BPS archive. Could this be ‘P.D.’?

I will leave the final word on P.D. and the other ‘*superbums*’ to Jimmy Dyce: “*Some growers today may assert they have the genuine varieties, passed down to them direct from growers in the early years of the Axminster “explosion,” but in the light of what actually happened, could those early growers be any more sure than we are that they had the real things and not look-alikes?”*

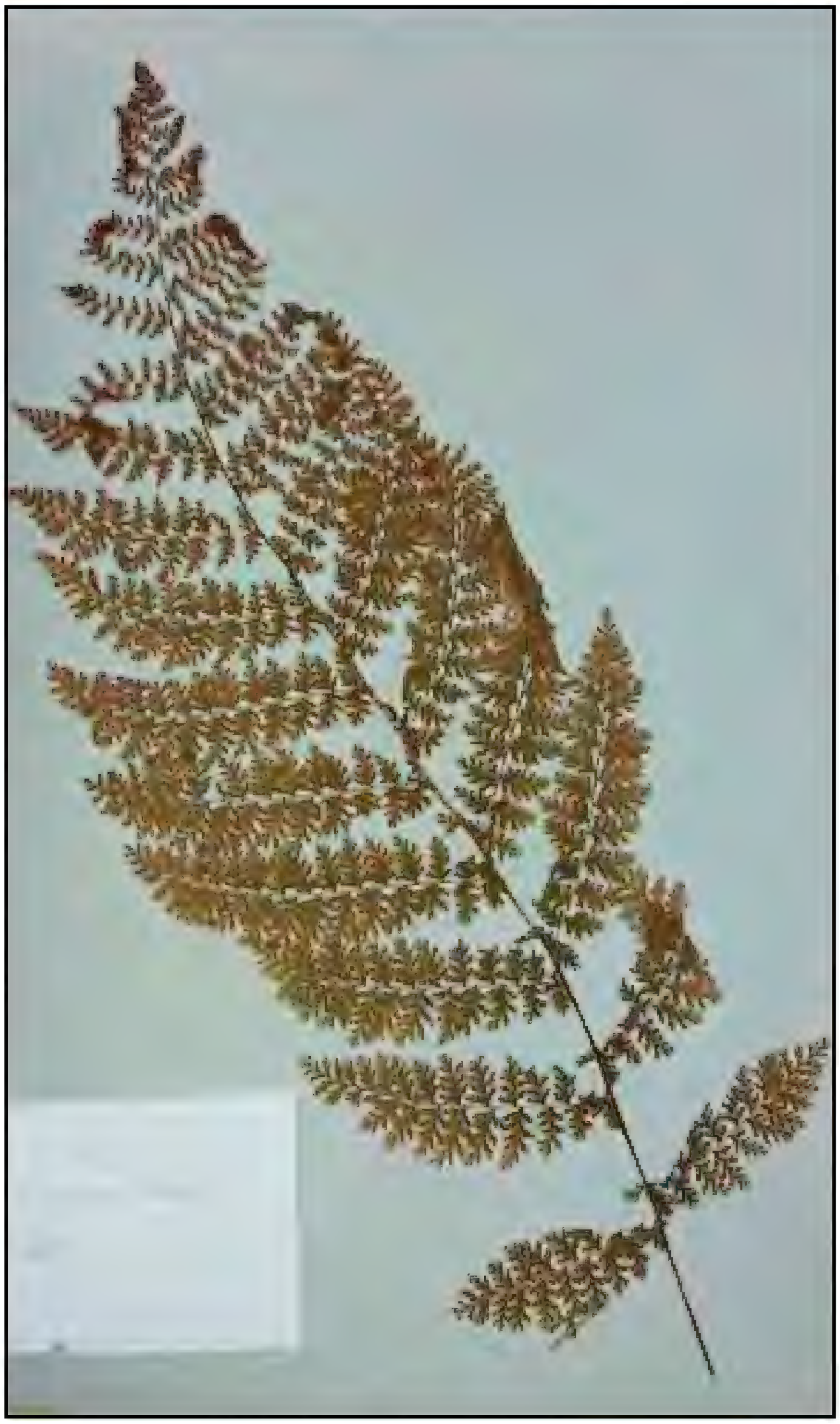

Fig. 6. Un-named herbarium specimen that could be *Plumosum Druery*
Photograph taken before accessioning to RHS Wisley.

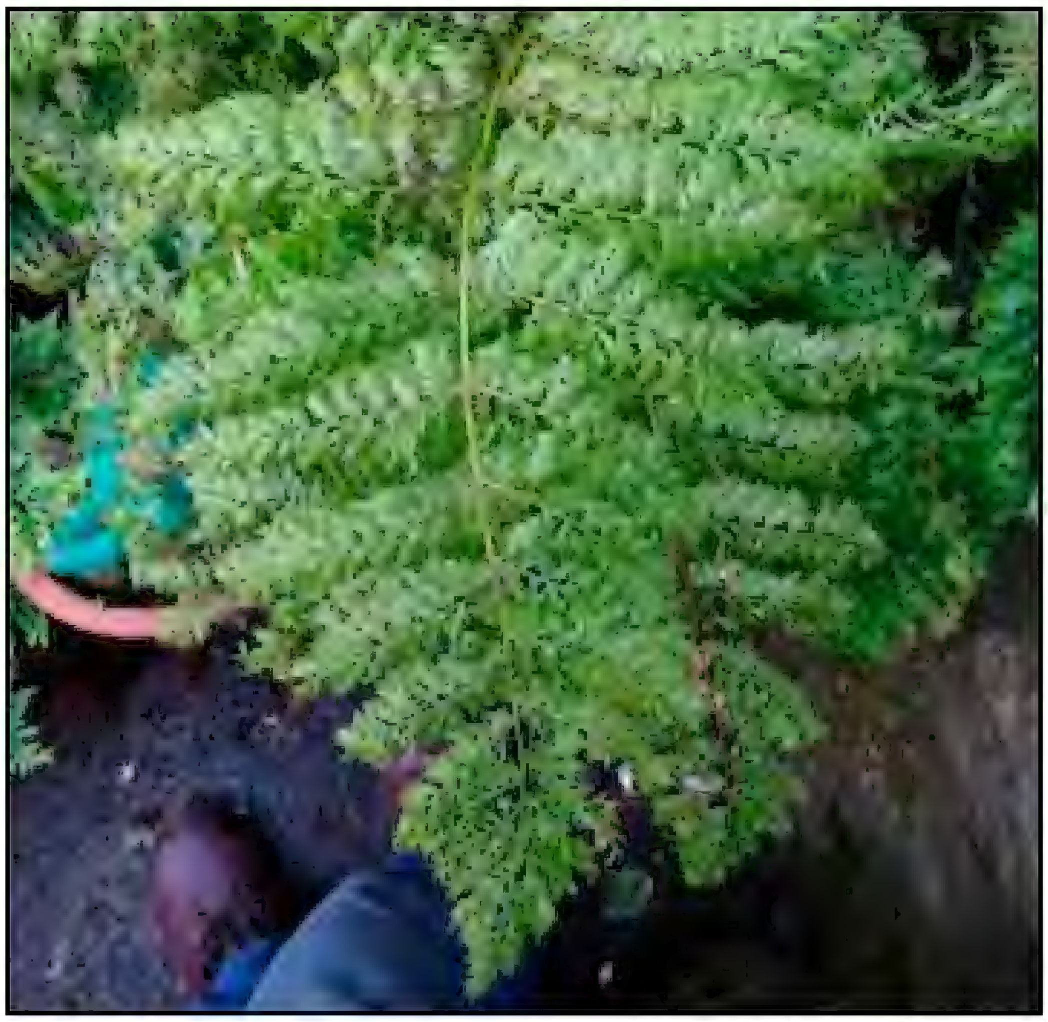

Fig. 7. A likely candidate from the Jim Lord collection

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The Rise and Fall of an Invading Polystichoid Fern

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University of Exeter, Cornwall, UK
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As part of my ongoing use of ferns as monitors of change in biodiversity patterns across time, potentially invading species can offer additional information to more widely-developing pictures of native species change. All tend to emphasise what dynamic and potentially sensitive plants pteridophytes are towards patterns of change occurring; ferns can act as indicators to such changes in relation to species, locations and time, offering constant new surprises (Page 1988). The importance is to observe and record them as they take place, and from these draw longer-term species interpretations.

Polystichum polyblepharum is a fern that few in Britain will have much heard of before about 25 years or so ago, apart from a few specialist growers (and I would be interested to know when they first met it). I see, however, it is mentioned by Barbara Joe Hoshizaki in the original edition of her fern grower's manual for the USA in 1975. Since at least the late 1980s, however, it is a fern which has become more widely-available in various trade outlets in the UK, as it is relatively easy to grow. It is reasonably hardy, and has considerable innate potential as a frequent local colonist, deriving from spores from garden-grown plants. It can sometimes be found on road-banks and Cornish hedges (which, thanks to the presence of mosaics of recurring disturbance regimes, have provided valuable habitat opportunities for much fern diversity to survive locally, and others appear anew – Page 2002, 206b). It has particularly shown a tendency to invade disturbed areas within such semi-managed and unmanaged landscapes, effectively arriving unseen as self-set individuals, either individually or sometimes with other ferns in considerable numbers. *Polystichum polyblepharum* is from Japan, and experience of such natural arrivals in west Cornwall shows that sporophytes of such self-set individuals clearly find the atlantic-seaboard climate suitable to the degree that they can themselves grow to fertile and spore-yielding adult sporophytes within as little as 3-5 years from first establishment. These then can act as sources of spore-release for further colonisation.

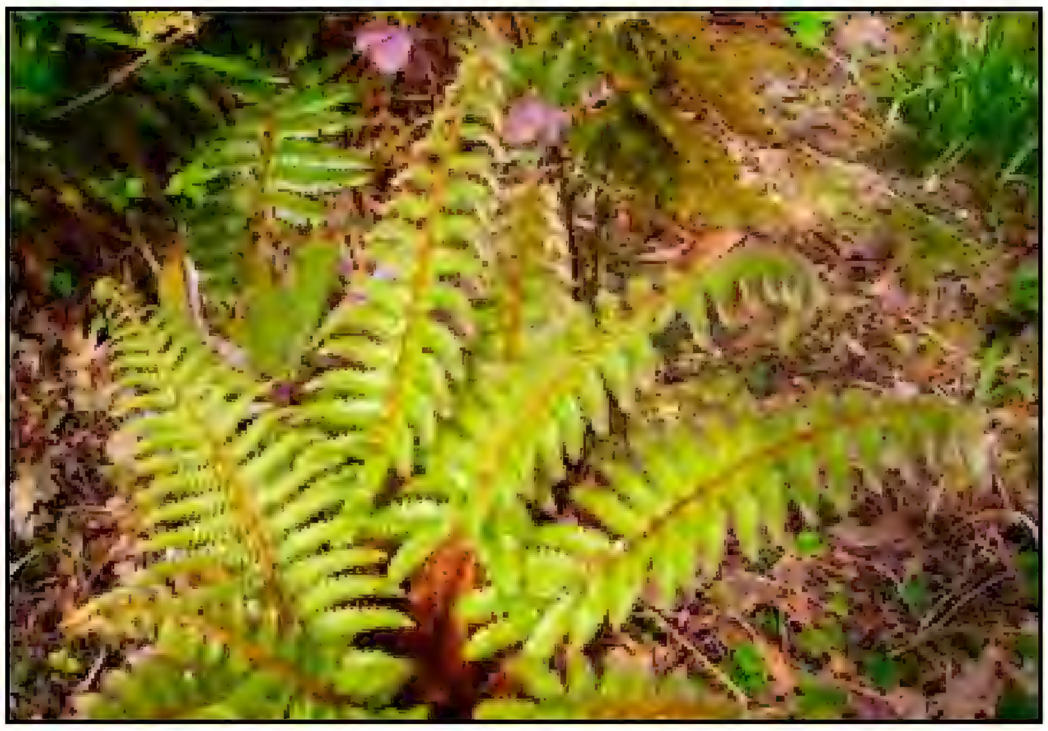

Fig. 1. Early-stage sporeling self-colonisation of shady earth-bank path-side surface, with sporophytes showing of *P. polyblepharum* (far left), *Asplenium scolopendrium* (mid-left), and at least four *Cyrtomim caryotidium* (scattered), west Cornwall, early 2000's

Colonists do not seem to do any harm, as far as I have been able to observe, to native species populations, either of ferns or other plants. New colonists just appear amongst them, and are quite garden-attractive plants. Therefore in such sites they have not been in any sense unwelcomed, and experience suggests are seldom removed. Their appearance does, however, add an additional element to observation of fern populational dynamics, for the picture has not been one of a simple and linear progression of numbers. It seems instead, at least in west Cornwall, to have been one of a rise-and-fall, and for this reason is particularly well worth noting. The attached photographs are from a larger record of dated and located individuals that I have recorded over the years, which I hope to make the basis of a wider study, and the following observations are merely a brief generalisation from those gained from the history of this species in west Cornwall from these more detailed observations.

I first became aware of the presence of *Polysticum polyblepharum* as a semi-natural self-coloniser in Cornish gardens in 1992. By then it was already established in some areas, with plants that I then estimated to be already up to 4-5 years old; this might indicate that initial colonisations began here the late 1980s, and this seems to generally accord with views of other biological recorders.

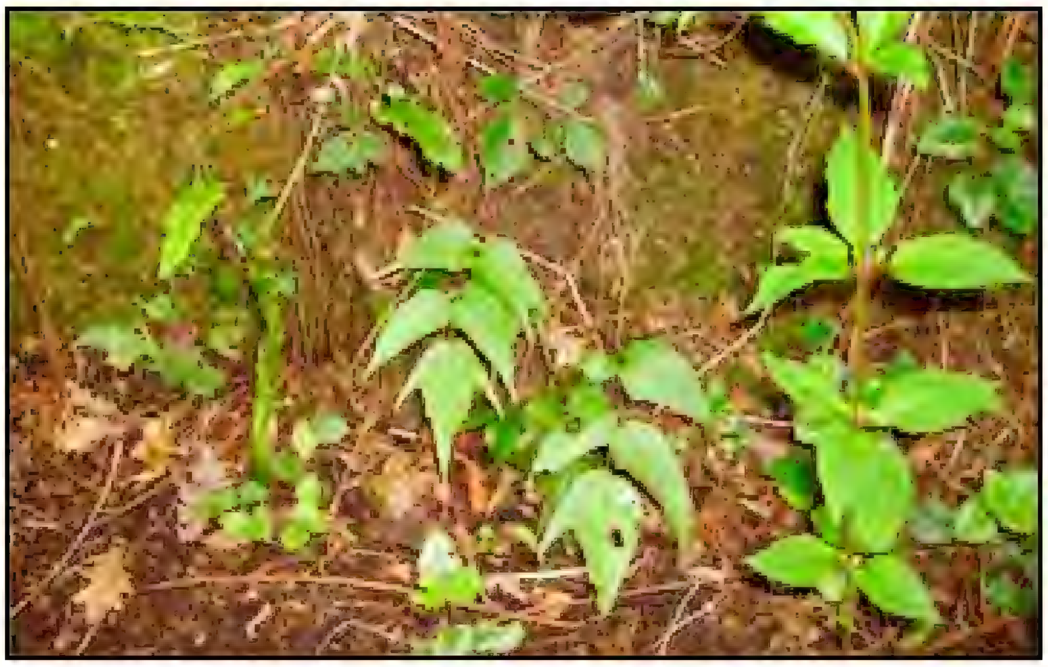

Fig. 2. Cultivated (and presumably planted) garden specimen of *Polystichum polyblepharum*, which has likely been at least one spore-source, west Cornwall, early 2000's.

My initial observational recordings were of plants presumably derived from planted specimens introduced to some of the more famous west Cornish Gardens. These latter mostly tend to be at low altitudes, usually under 100ft, in locations which are often highly sheltered and moist, and under strong influence of Atlantic maritime climates. By the late 1990s, I was then finding fresh colonists of this species far more widely, generally in smaller garden habitats or their surroundings, such as roadside banks, up to about 300ft; this seems to be its maximum limit, but it demonstrates that the species is fairly hardy.

By the year 2000 the species appeared to be luxuriating in many places, and I reached the general view that it looked like it was here to stay. Between the first year of this century and about 2010, encountering new plants of *Polysticum polyblepharum* establishing was a quite common occurrence. Indeed I even found one plant of it, on a rocky bank, growing with various natural individuals of *Polysticum setiferum*, together with one individual that appeared to be a hybrid between them. Unfortunately, over-zealous hedge-trimming by tractor removed this individual shortly after I found it; it hasn't returned. However, to my surprise, from about 2010 *Polysticum polyblepharum* has diminished or disappeared. Even where plants had been well-established in gardens they have slowly died out, and new colonists have been increasingly few.

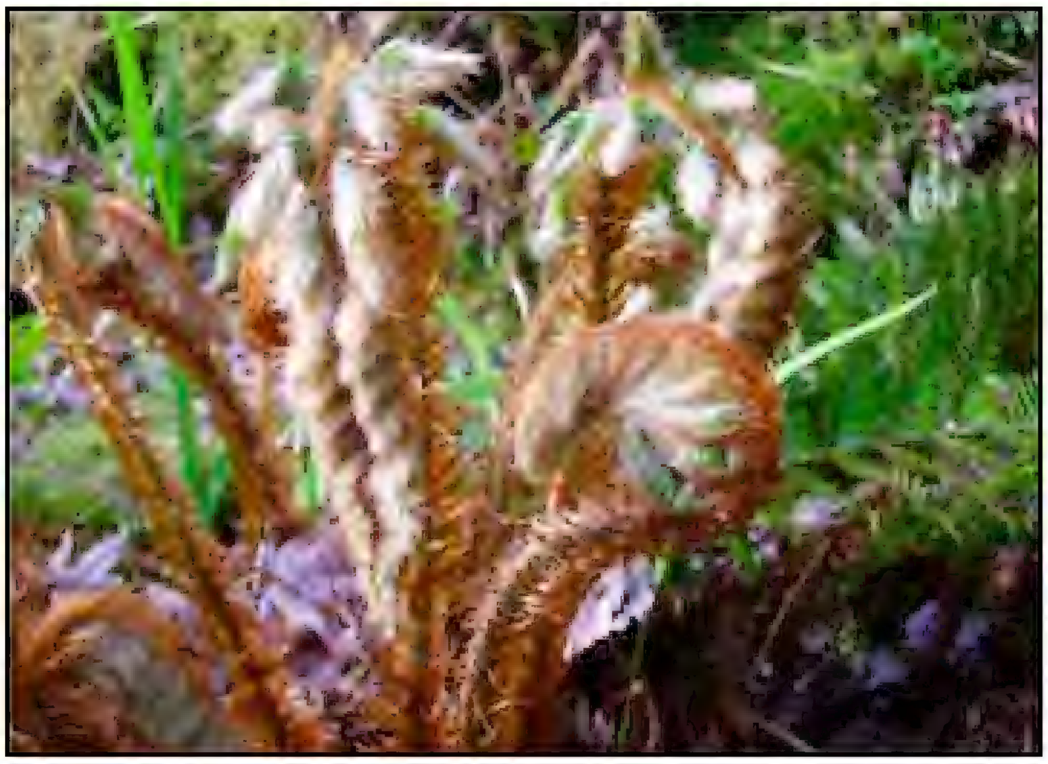

Fig. 3. Early-season growth of self-set sporophyte of *Polystichum polyblepharum*, showing characteristic high degree of scaliness of croziers, making plants easily detectable even at this stage, west Cornwall, early 2000's

I do not know the reasons for this apparent 'rise-and-fall', but the occurrence of this cycle is important to record for the future. Have climatic conditions somehow changed for the better and then for the worse? Or have there been other innate biological reasons why this fern should have succeeded and then suddenly diminished? If there was a disease, then I never saw any plants looking diseased – all always looked remarkably vigorous and healthy. Perhaps plants are short-lived anyway, and most first-colonists just all reached the end of their natural life-spans; however this would not explain why few new colonists are now occurring. I would be interested to hear the experiences of cultivators and other recorders. But its history, at least here, underlines that ferns can have particularly great sensitivities to environmental conditions, and trying to understand what they are able to teach requires constant observations and assessment (Page 2006a-b).

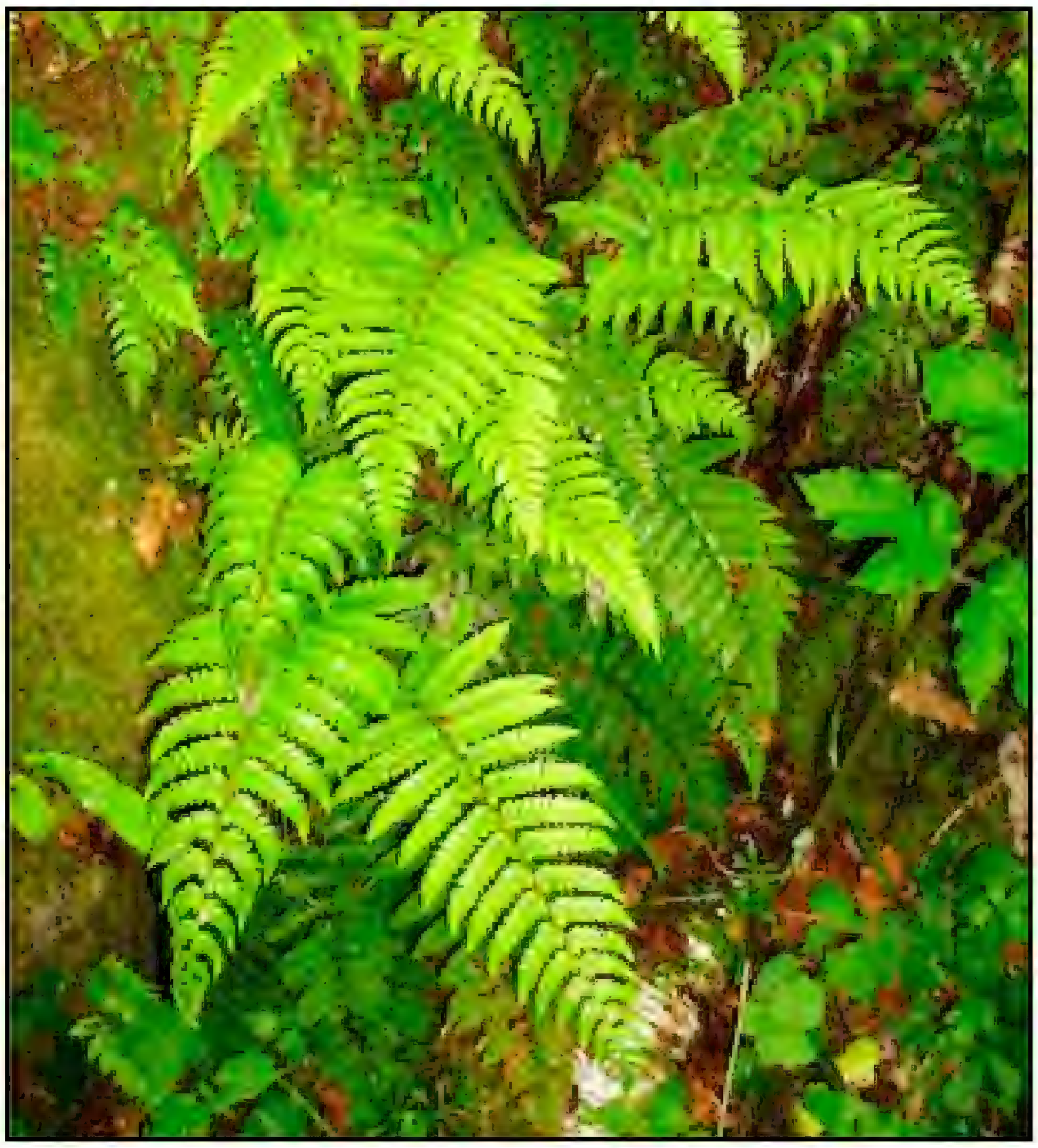

Fig. 4. Very numerous individuals of pure *Polystichum polyblepharum* self-colonisation at various early to late-stage sporophyte establishment episodes on steep shady path-side damp earth bank, west Cornwall, early 2000's.

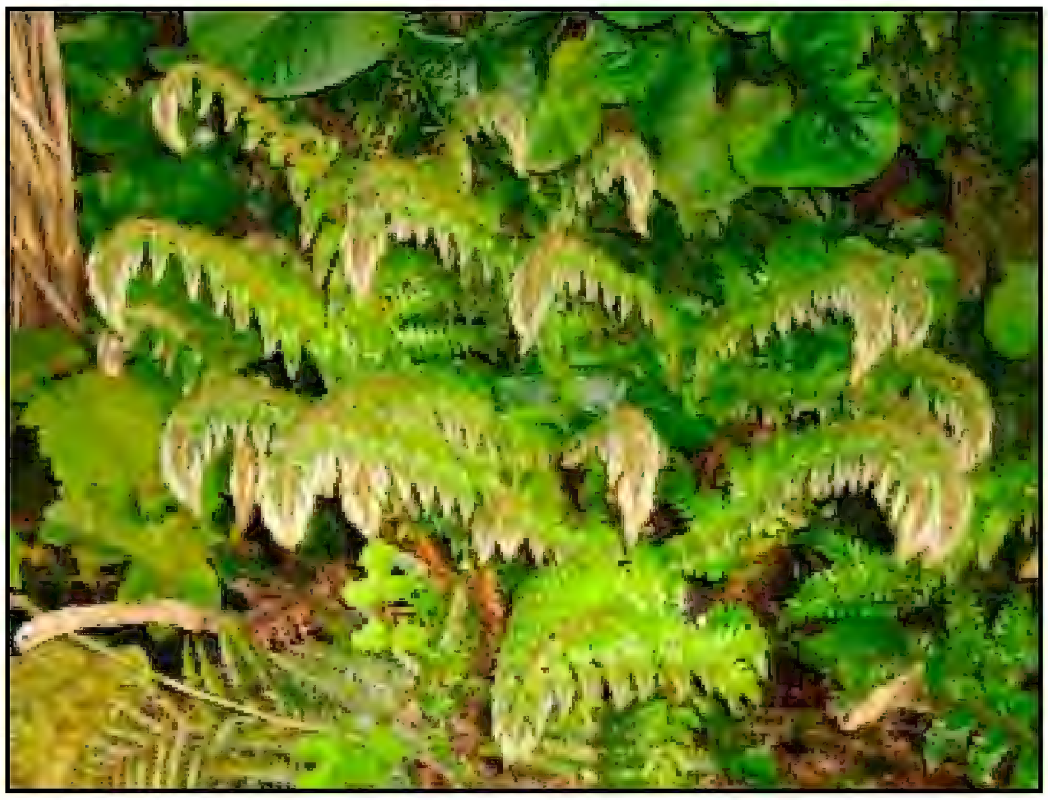

Fig. 5. Well-advanced originally self-set sporophyte of *Polystichum polyblepharum*, identifiable by its early-season slow frond-unfurling habit and characteristic laid-back frond tips, west Cornwall, early 2000's.

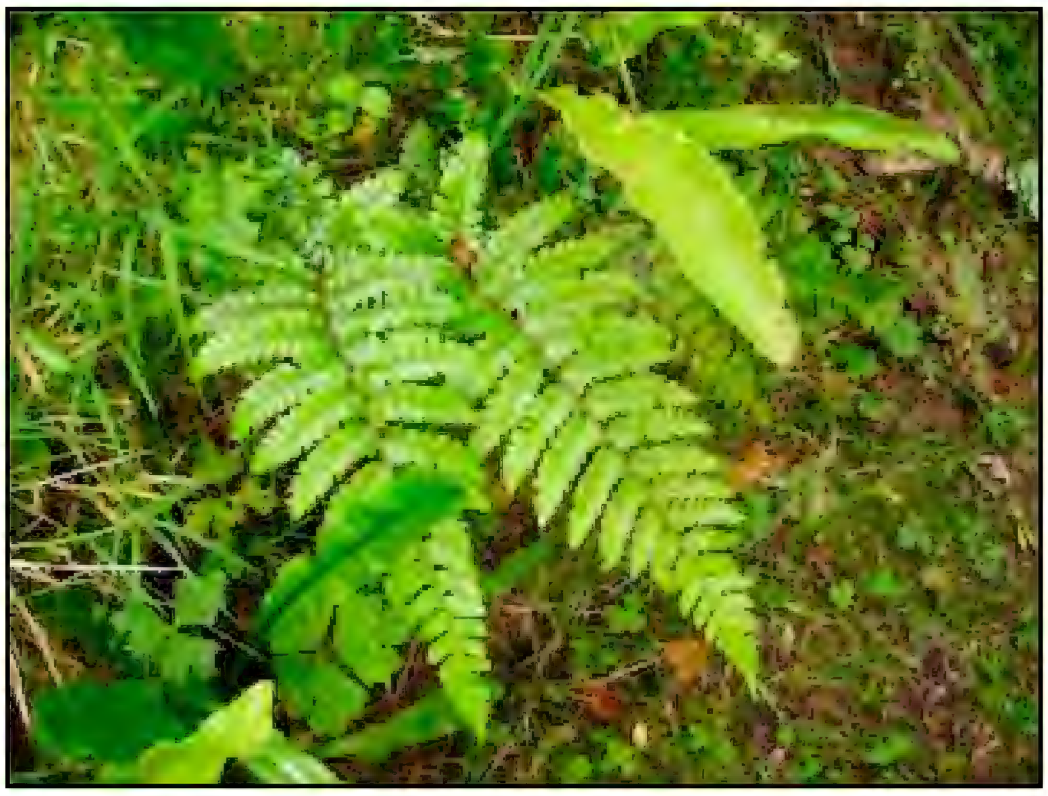

Fig. 6. Isolated but well-established individual *Polystichum polyblepharum* self-established at foot of Cornish Hedge, west Cornwall, 2008.

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Winter Ferns in Sweden. A Short Story

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We bought our current house in 1997. It is a small house with a small garden and, as it is my fifth garden, it is also the last one. I should have known better, but I planned an English cottage garden with a lot of big glorious perennials, lots of fragrance, insects and colour. And it was, during summer, very nice, but when autumn came, and the rains and the wind, sometimes also the frost and the heavy snow, everything fell to pieces. The borders were beige, pieces flew around and everything was dead and sordid. Not what I wanted. In this part of Sweden, on the west coast, we have 'winter' and bare branches from about the middle of October until the middle of April, and that is quite a long time to look at dead perennials. Something had to be done. I started replacing perennials with winter green bushes such as *Rhododendron*, *Ilex* and a selection of dwarf conifers (and some rather big ones too!). The garden became slowly more and more shady and the small perennials that were supposed to grow under the bushes didn't like that very much. Of course you can use hostas, but they die back in winter and then there are snails and slugs. About 15 years ago I suddenly realised that there were ferns that looked quite nice in winter! That was a new discovery! I knew of course that *Polypodium* was winter green and perhaps a few others were at least green but untidy. Little did I know and a new world opened up! As I tend to start collections once an interest has popped up, I immediately started to collect ferns instead of rhododendrons. Well not quite instead of, but the foremost purpose was to find good ferns for winter interest. There turns out to be quite a lot.

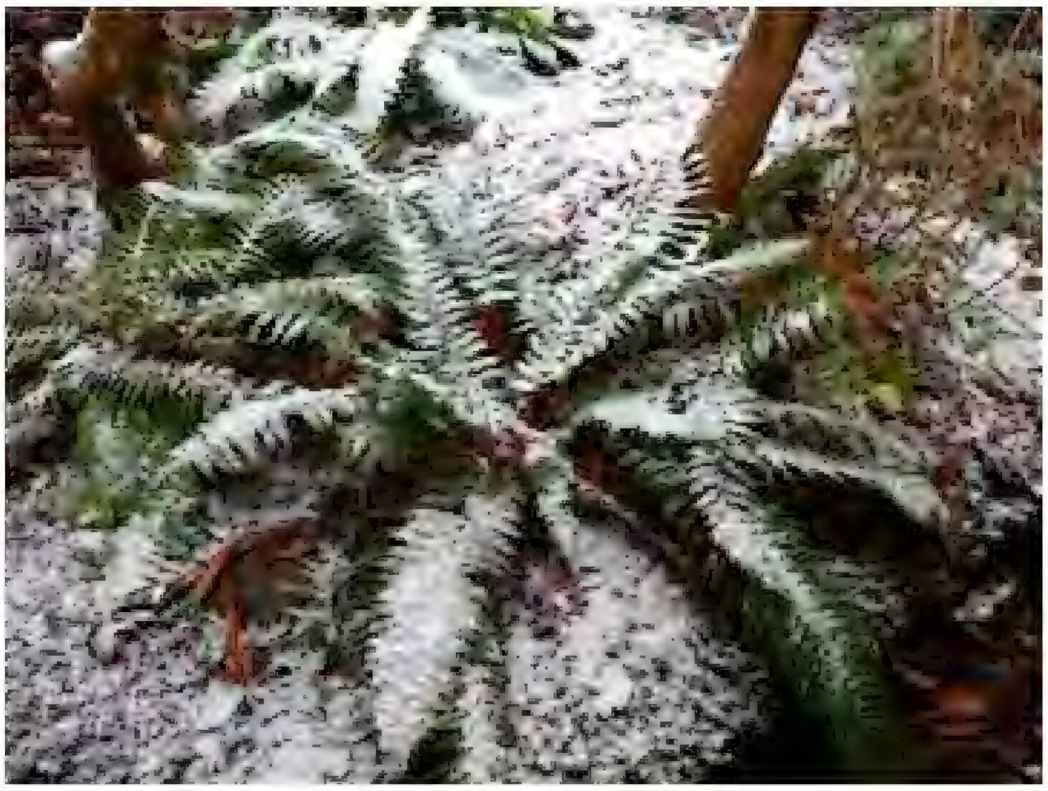

Fig.1. *P. neolobatum* - Jan 22 2019

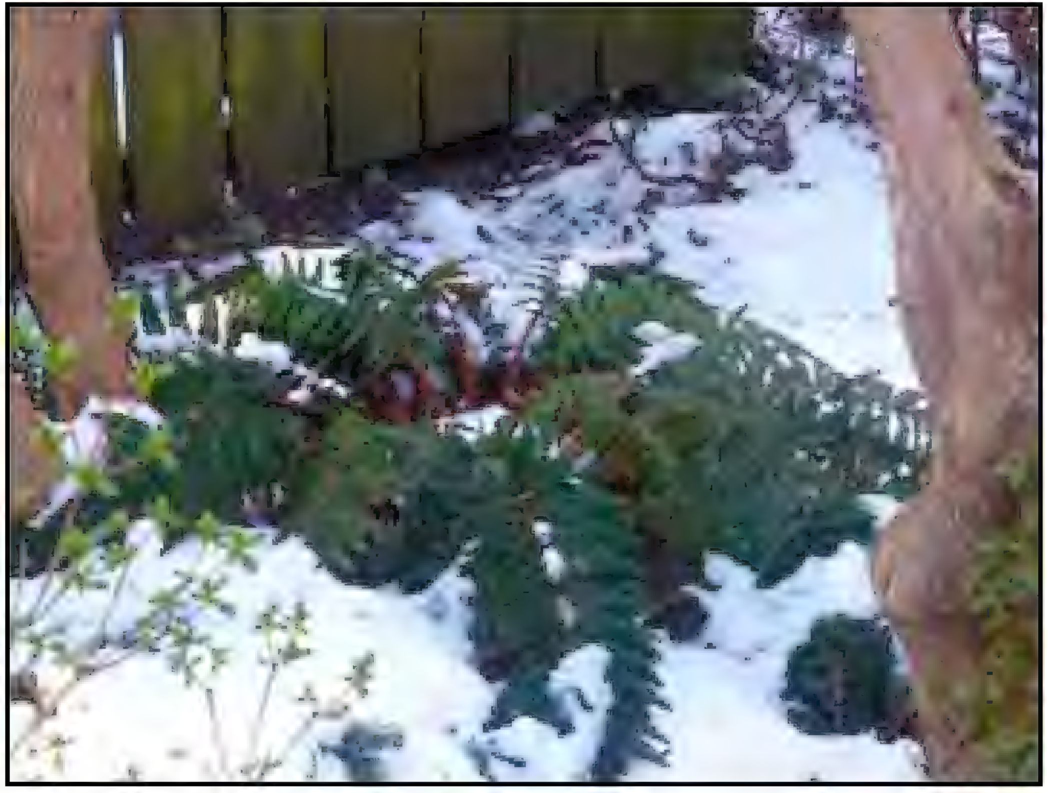

Fig. 3. *P. neolobatum* - Feb 09 2019

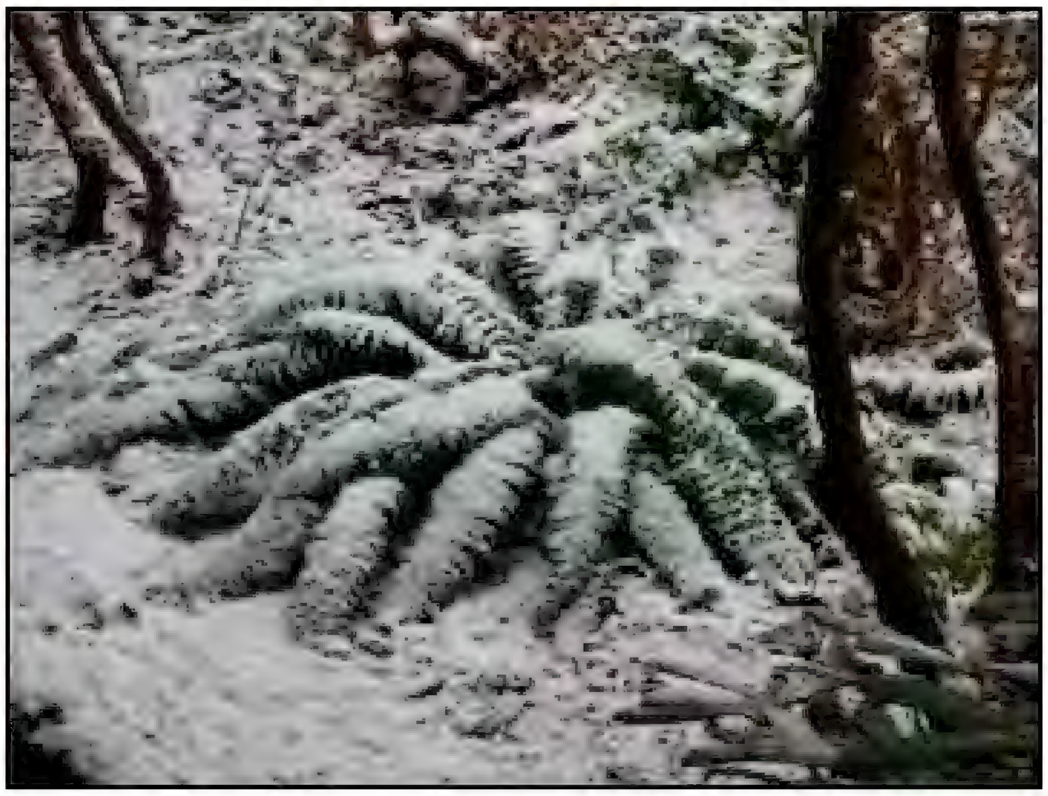

Fig. 2. *P. munitum* - Jan 22 2019

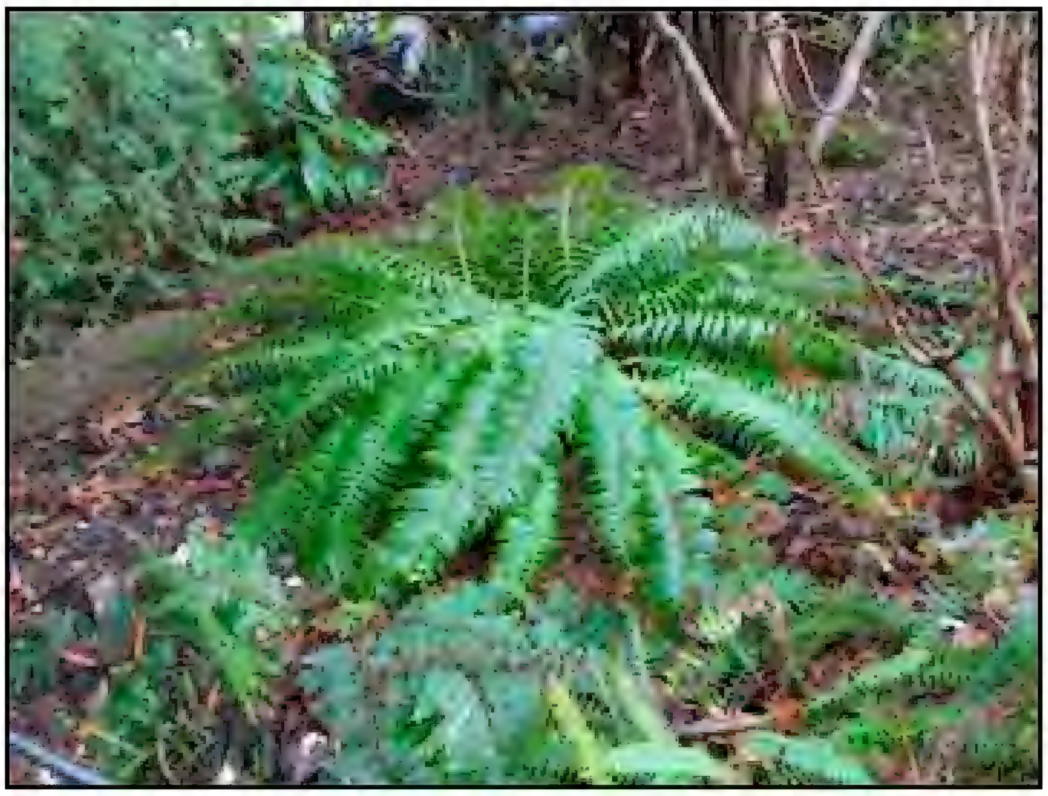

Fig. 1. *P. munitum* - Feb 09 2019

The absolute best and one of the first I found was on a trip to Germany, to the Plant Market in Kiekeberg. It was a rather large pot with a fern that later turned out to be *Polystichum neolobatum*. It was labelled something different, which I soon realised must be wrong since the descriptions in the books didn't seem to fit in with what I had obtained. For a new enthusiast it is not easy to find the right

Winter Ferns in Sweden. A Short Story

name, and it was a couple of years before I was certain. But the plant was a great success from the beginning. The shiny, dark green, thorny leaves with their soft and innocent new appearance in spring have been a delight ever since!

During the years it has grown in my garden it has been covered in snow several times and always manages to look fresh and springy again. Quite remarkable! I don't even have to tidy it in spring, I just let the old leaves stay, as they actually are quite all right for at least two, maybe even three years!

Another really good one is *Polystichum munitum*. I bought that one from a local nursery, but I think it came as a plug plant from elsewhere. This has turned out to be just as good as the *P. neolobatum* in winter. It can stand being covered in snow without staying flat on the ground afterwards and it is green and fresh throughout the winter. I cut it back around April when it gets untidy and the snails and slugs start to thrive underneath the old leaves. I like the polystichums in spring with the bold new stipes and their heads thrown back it triumph!

The third best in winter is one of the *Polystichum setiferum*, variety '*Nantes*'. I think it is one of the best performers in the garden. I like fronds growing dark and shiny and upright and this is a good one! But the fact is, I like the young plants best! This variety develops divided fronds when it is mature and then the tips get heavier of course. Not so tidy then. The *Polystichum setiferum* varieties are beautiful in their different ways but '*Nantes*' is rather more upright in habit than many of the others.

Ferns have been a wonderful new acquaintance for me! My garden is packed with plants, but it is rather strange - there is always room for every new fern I find! And this is a short story, there are many more ferns doing fine most of the year, even here in the north!

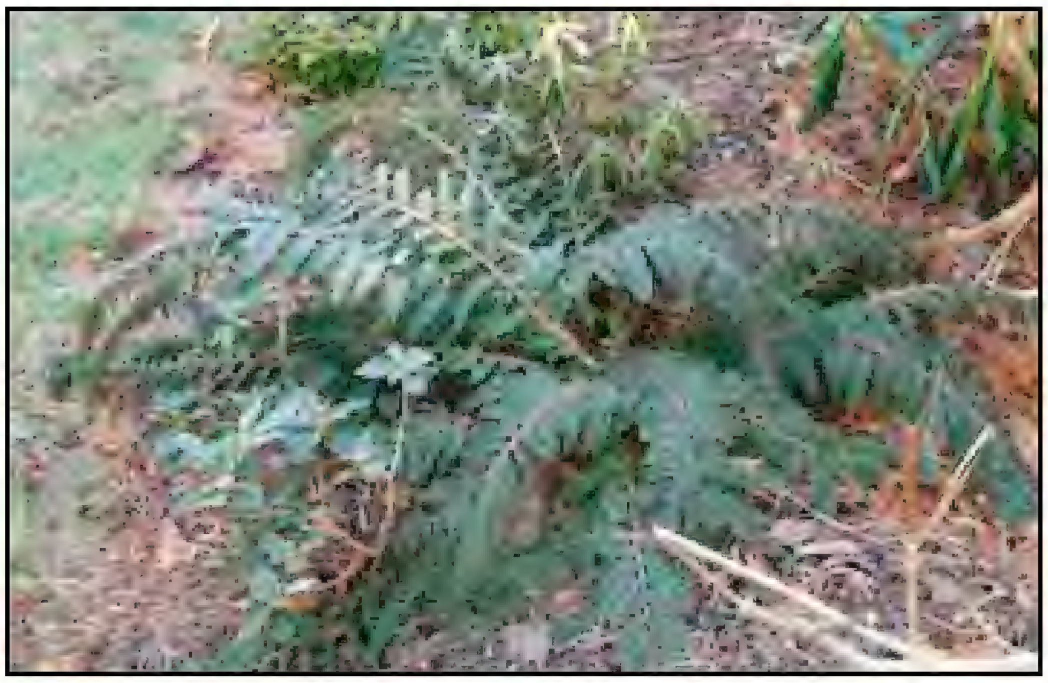

Fig. 2. *P. setiferum 'Nantes'* Jan 18 2019

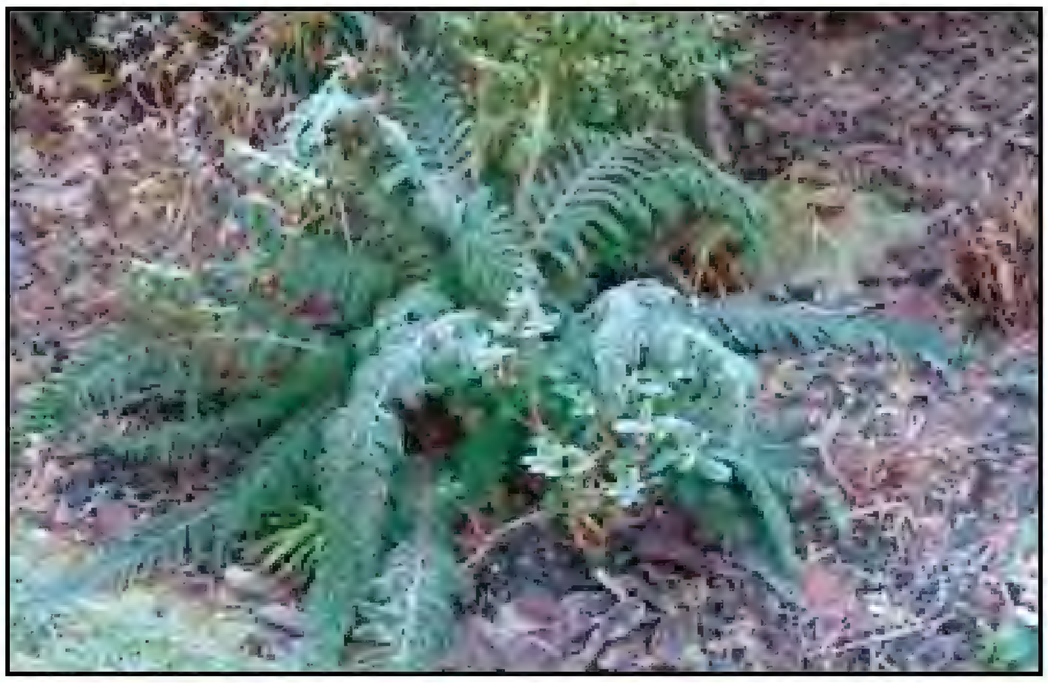

Fig. 5. *P. setiferum 'Nantes'* - Dec 5 2017

E IS FOR EDUCATION!

Although we are only a small Society, we are fortunate with the number of members who volunteer to run BPS via the Committee and on the various sub-groups. The Education Group is one of the sub-groups – there are eight members, some of whom already have other roles for BPS, who meet annually to decide which events Education will promote and support throughout the coming year.

The aim of the Group is to educate the public about all aspects of ferns and the role of the Society in achieving this. The Group members are spread widely across the UK so we are able to assimilate news about what is happening in many different areas. This also has its problems as the travel distances are not always conducive to everyone in the Group being able to physically attend events. In this case, we would try to encourage other local members to assist in the running of an event.

We have got, and are always producing, material to help those that are setting up displays, shows, talks, etc. on behalf of the Society, so please make contact with us to see what we can help with if you have been asked to take part in any event.

The best way is via this email address - education@ebps.org.uk – you will always get a response!! We intend to put an article concerning BPS Education news in every Pteridologist from now onwards.

The photo shows a Group of the General Public attending a Fern ID event at the World Museum, Liverpool run by Alison Evans – an Education Group member.

Asplenium rhizophyllum x *tutwilerae*, a Newly Made Old Hybrid

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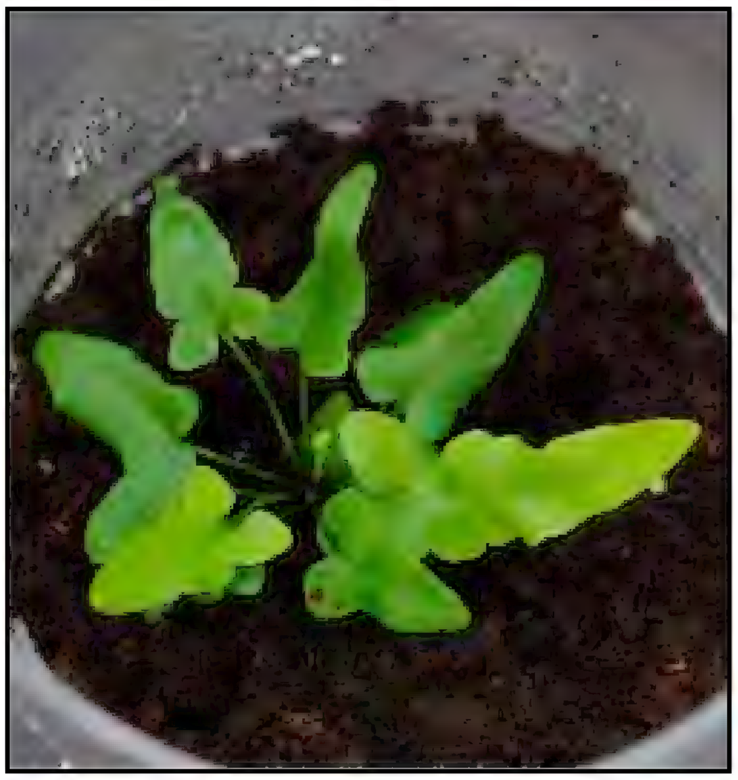

Fig.1. *Asplenium rhizophyllum* x *tutwilerae*, March 2015

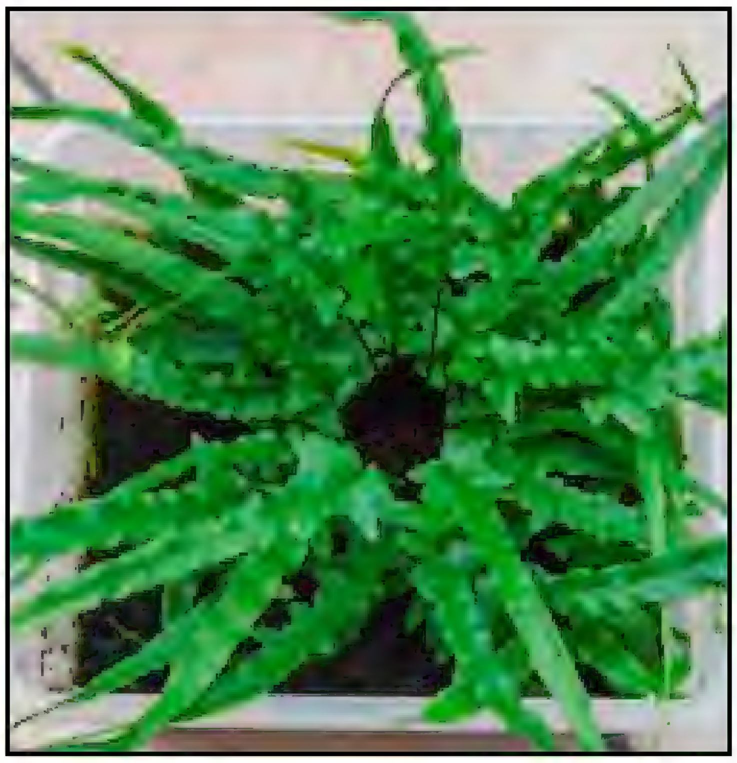

Fig.2. *Asplenium rhizophyllum* x *tutwilerae* in September 2016, still indoors

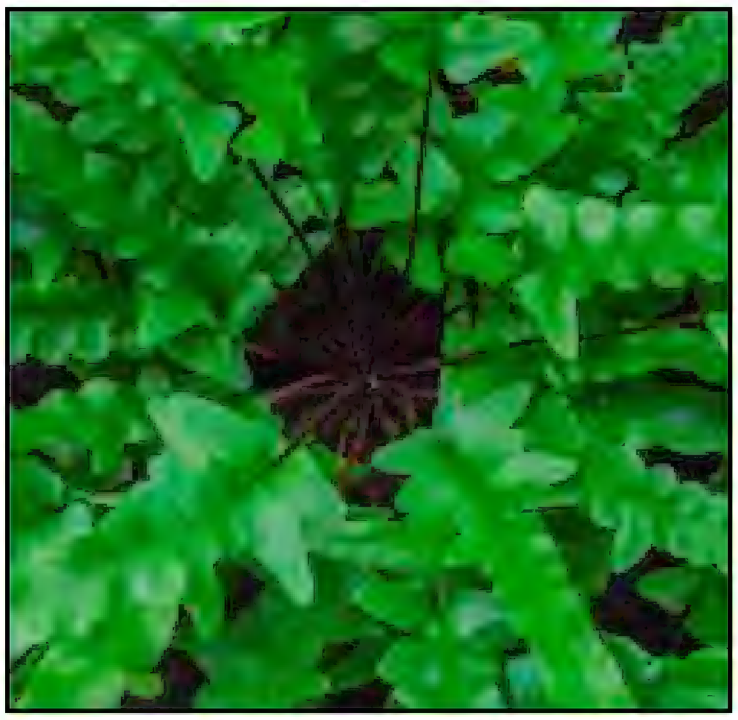

Fig.3. Hybrid September 2016, close-up

Asplenium rhizophyllum

Asplenium rhizophyllum L. (Syn.: *Camptosorus rhizophyllus* (L.) Link), the Walking Fern, grows in eastern part of North America and is a parental species of a group of Asplenium species and hybrids in the Appalachian region. One cross occurs with *A. platyneuron* (L.) Britton, Sterns & Poggenb., the Ebony Spleenwort. This hybrid is found at several places where both species grow together. It is normally sterile but at one locality a plant was found which was fully fertile. For a long time it was controversal whether it was a hybrid or a new species, and it was cited as *A. ebenoides* or *A. x ebenoides*, the Scott´s Spleenwort or Dragon Tail Fern. The fertile plant was discovered by Julia Tutwiler (1841-1916) (an honoured person in the public life of Alabama, active in education and prison reform, and as a poet) in 1873 at Havana Glen in Hale County, Alabama. By reason of the fertility it is in the trade and widespread in American and European fern gardens under the name *A. ebenoides*. In 2007 it was separated from the sterile hybrid plants as a new species and named after Tutwiler as *Asplenium tutwilerae* by Keener & Davenport. This is now the correct name for all fertile plants we have in culture.

As fertile species, *A. tutwilerae* is able to backcross with its parents. Both backcrosses are known. The cross with *A. platyneuron* is *A. x boydstoniae*. The backcross of *A. tutwilerae* with *A. rhizophyllum* has been found once in nature (Shepherdstown, Jefferson County, West Virginia, on moss-covered limestone cliffs). At this locality no *A. tutwilerae*

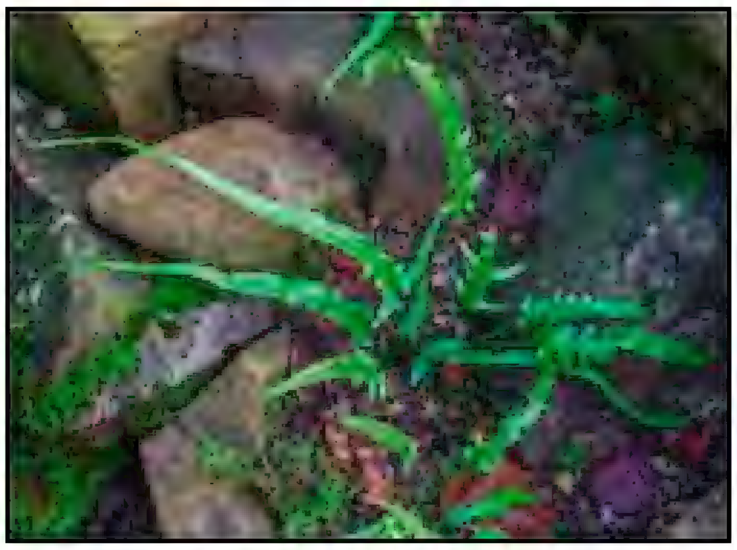

Fig.4. *Asplenium rhizophyllum* x *tutwilerae* in November 2017 after its first summer outdoors in the rock garden

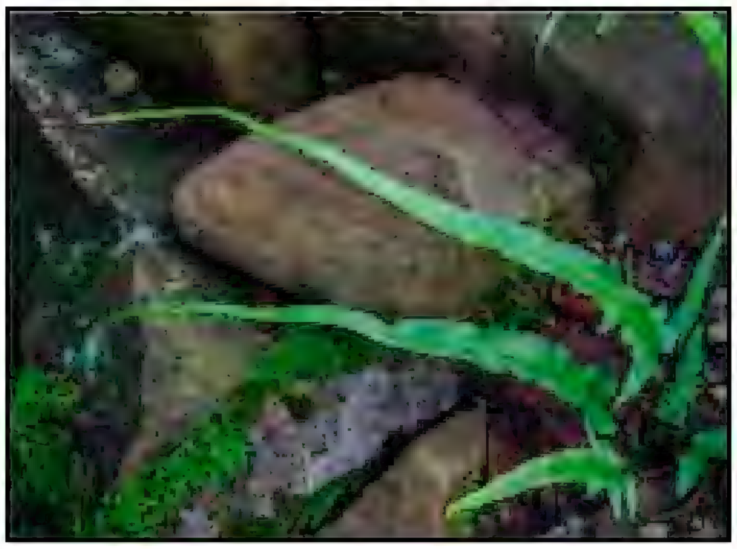

Fig.5. *Asplenium rhizophyllum* x *tutwilerae*, close-up

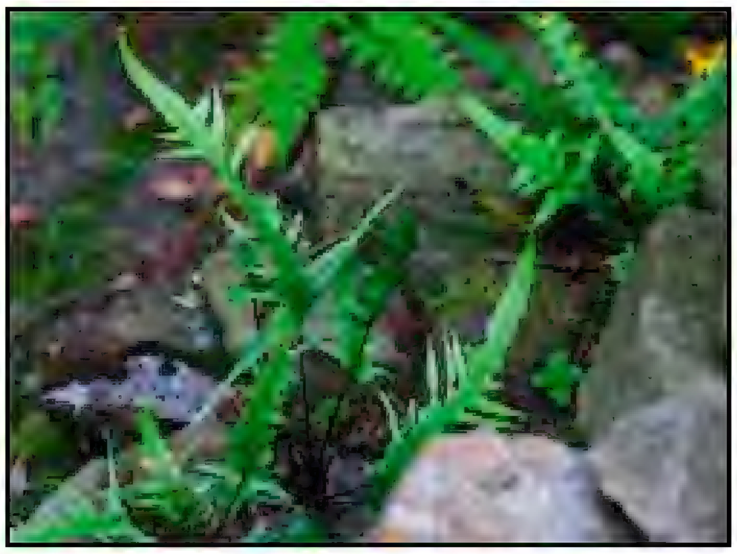

Fig.6. Full adult *Asplenium rhizophyllum* x *tutwilerae* in September 2018, the fronds are now very irregular. Some frond tips are still rolling out.

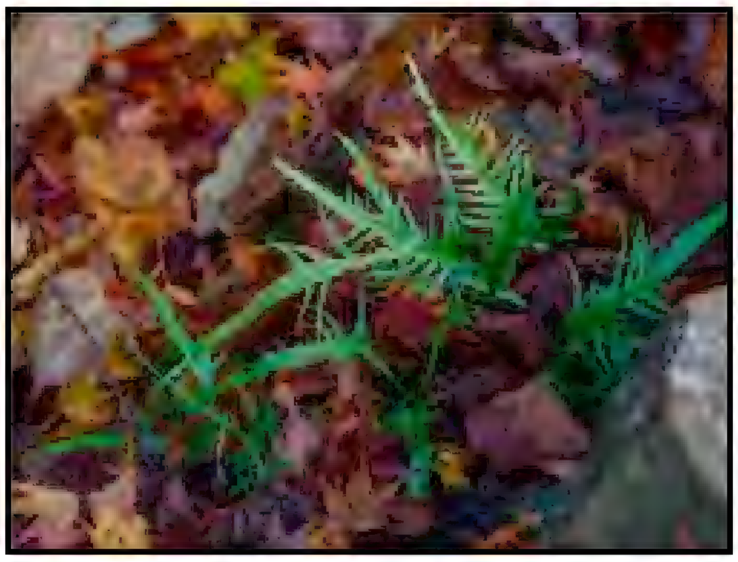

Fig.7. *Asplenium rhizophyllum* x *tutwilerae* in November 2018

was found; the formation of this hybrid plant is therefore mysterious. A second plant arose accidentally in a culture of *A. rhizophyllum* at Fernwood, Niles, Michigan, grown by K.E. Boydston. So far as I know this hybrid has not yet been named. I could not find out whether it exists still in science collection cultures. It is presumably not in the trade or in private gardens.

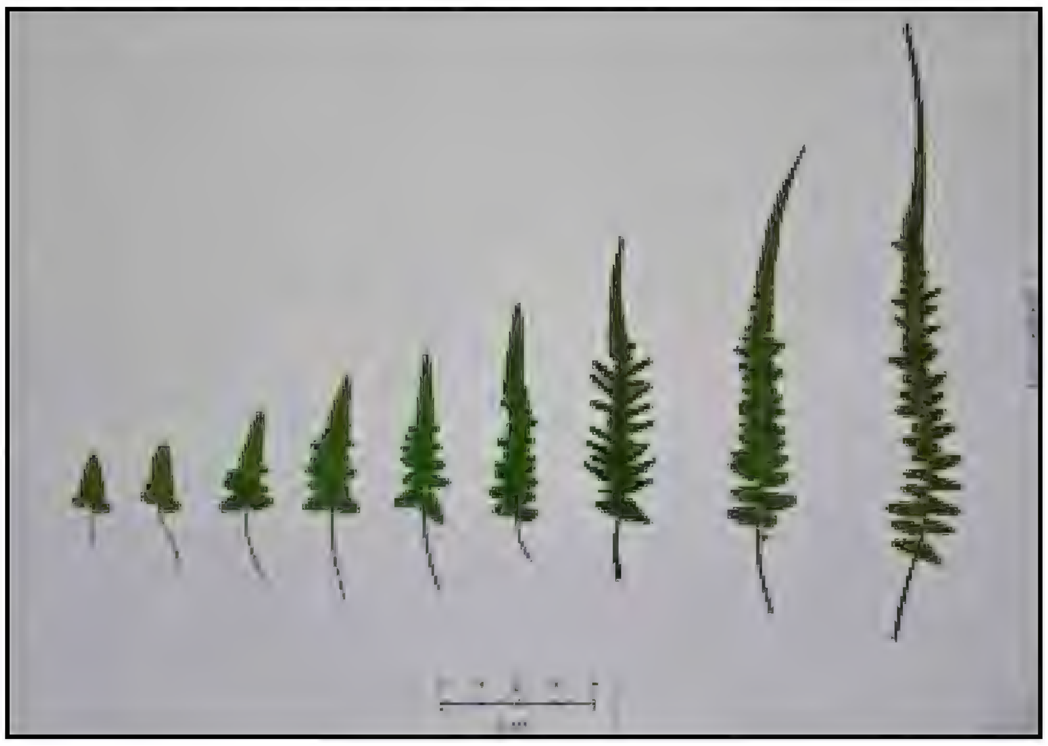

Fig. 8. Development of Asplenium tutwilerae, the largest frond has a length of 16.5 cm

Some years ago I decided to create this hybrid artificially. I sowed of the spores of *A. rhizophyllum* on Feb. 25th 2012; the *A. tutwilerae* spores were also sown in 2012. On Feb. 25th 2013 the prothallii of both species where pricked out in pairs together. Two hybrid plants arose. Both had *A. rhizophyllum* as mother and *A. tutwilerae* as father. I managed the trial in order that the chance of this combination was more probable because it was unknown to me what causes the property of building bulbils – is it the DNA or the protoplasm or both?; therefore I thought it would be better to have *A. rhizophyllum* as mother. The young plants resemble *A. rhizophyllum* more than *A. tutwilerae*. They produce very early bulbils on small fronds. Fronds of adult plants are mostly lobed only in the lower part, as shown in Wagner´s and Boydston´s article (see Fig. 12) **this will need changing*) but sometimes some extra large fronds resemble those of *A. tutwilerae* and are extremely irregular

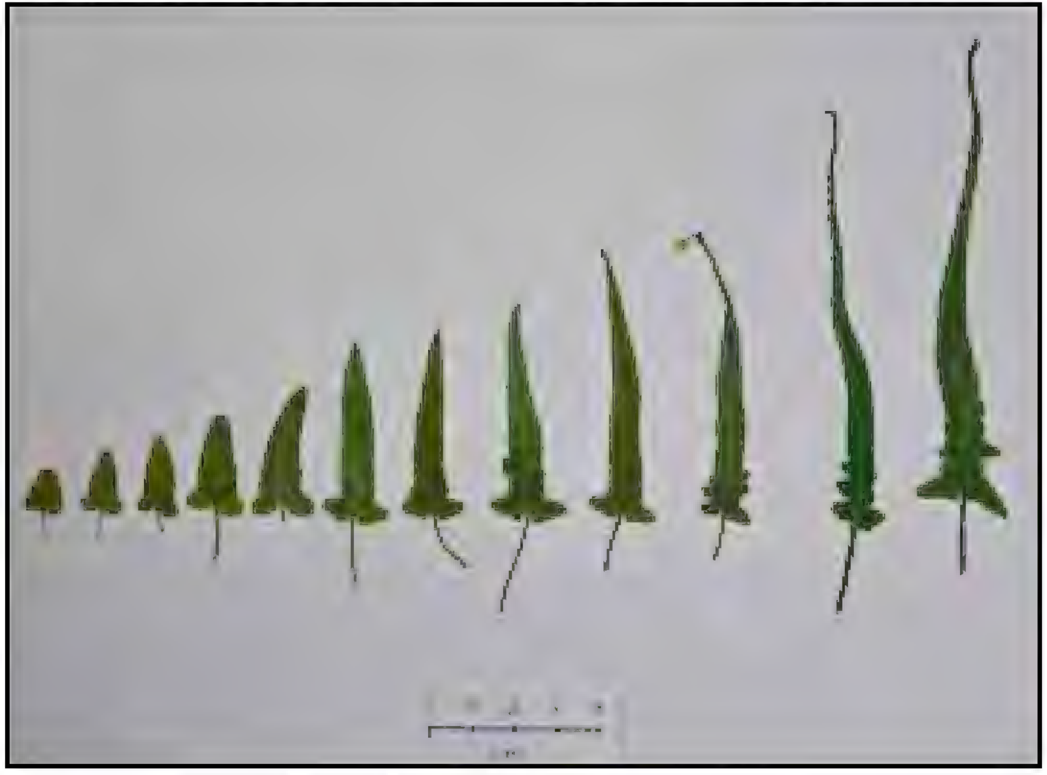

Fig. 9. Development of the hybrid

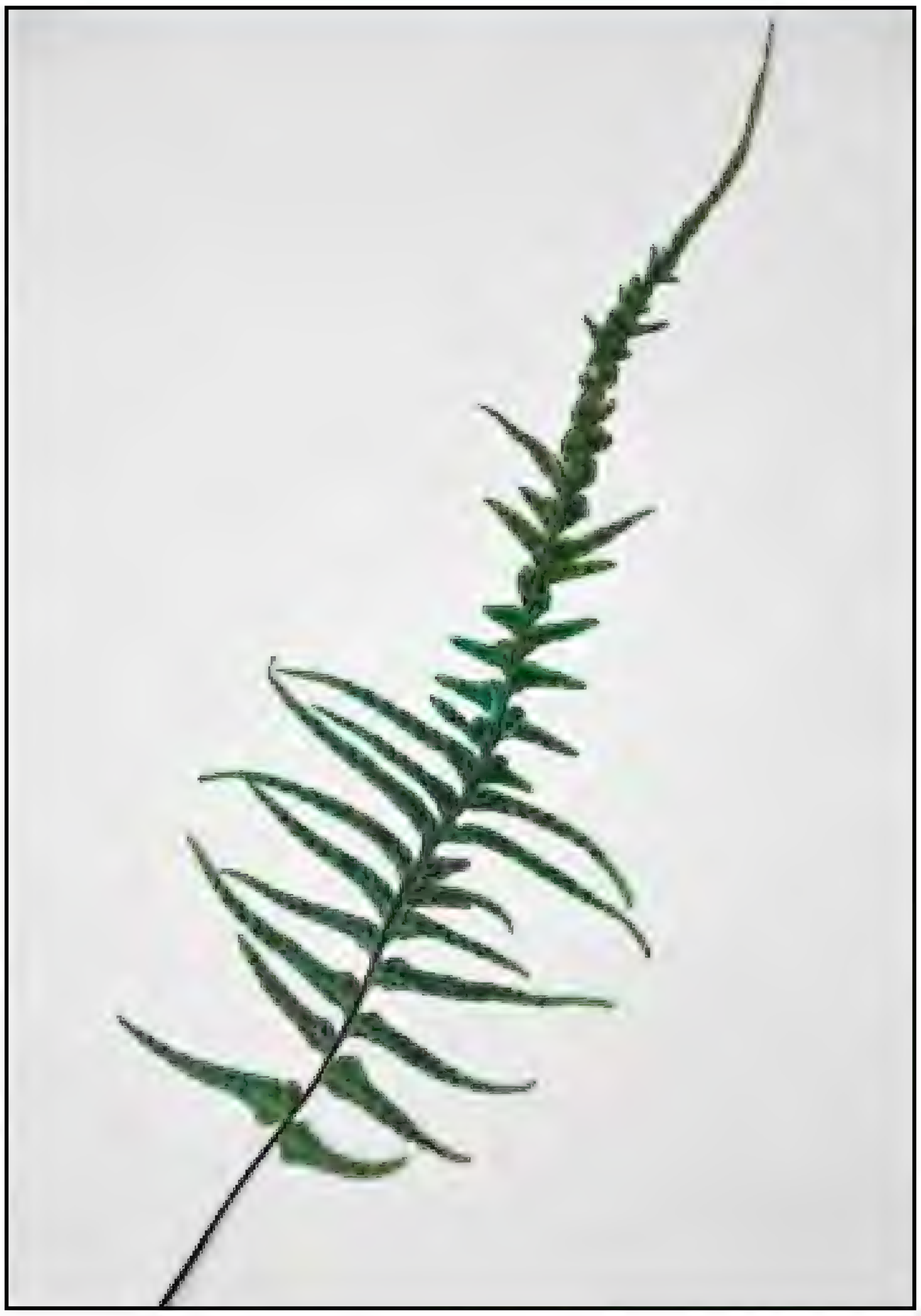

Fig. 10. Extraordinary large frond (28 cm) of Asplenium tutwilerae

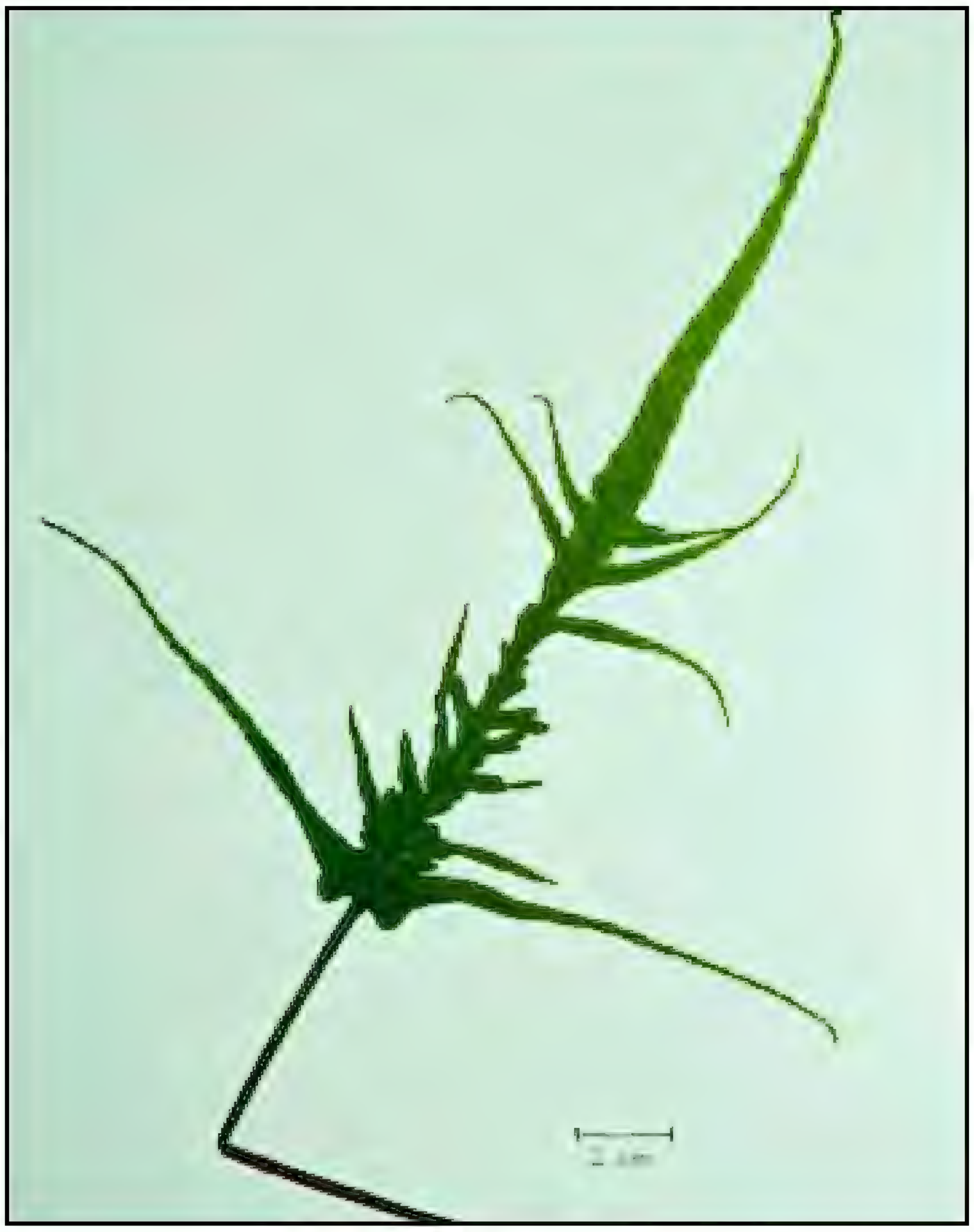

Fig. 11. *Asplenium rhizophyllum* x *tutwilerae*. Extra large frond, length 33cm. The tip of the frond is still not fully rolled out

(see fig. 11 **change*). Frond length can be 25cm or more. Large fronds of the hybrid show a phenomenon which can be seen in other hybrids in which *A. rhizophyllum* is involved: extremely long basal segments (see fig. 11**change*). Hybrids of *A. scolop*endrium sometimes show this attribute as well (see Pteridologist 2014, page 42-43).

In the past I have created some other hybrids with *A. rhizophyllum* (see Pteridologist 2014, p. 42 ff). These hybrids (*A. rhizophyllum x obovatum; A. rhizophyllum x billotii*) show the same difficulties in culture as *A. rhizophyllum* itself: they are attractive food for snails and slugs and also some insects, like grasshoppers, love them. This is a great problem, also with *A. tutwilerae* and other Aspleniums which have *A. rhizophyllum* or *A. ruprechtii*, the Asian Walking Fern, as one parent. The problem is exacerbated by the fact that these plants are also slow growing and awake late in spring. Surprisingly the hybrid *A. rhizophyllum x tutwilerae* will grow more quickly and suffered only minor damage from feeding. Perhaps the very dry summer of 2018 had sheltered the plants from hungry marauders. I cultivate the plants in neutral soil in light shade with little sun in late afternoon. The hybrid should be hardy in zone 4 or 5. It seems that the plants produce bulbils only when young and later is few chance to get the hybrid vegetatively propagated. Is it the reason that the old hybrid plants probably are lost? Therefore all chances must be used for bulbil propagation because the hybrid is sterile!

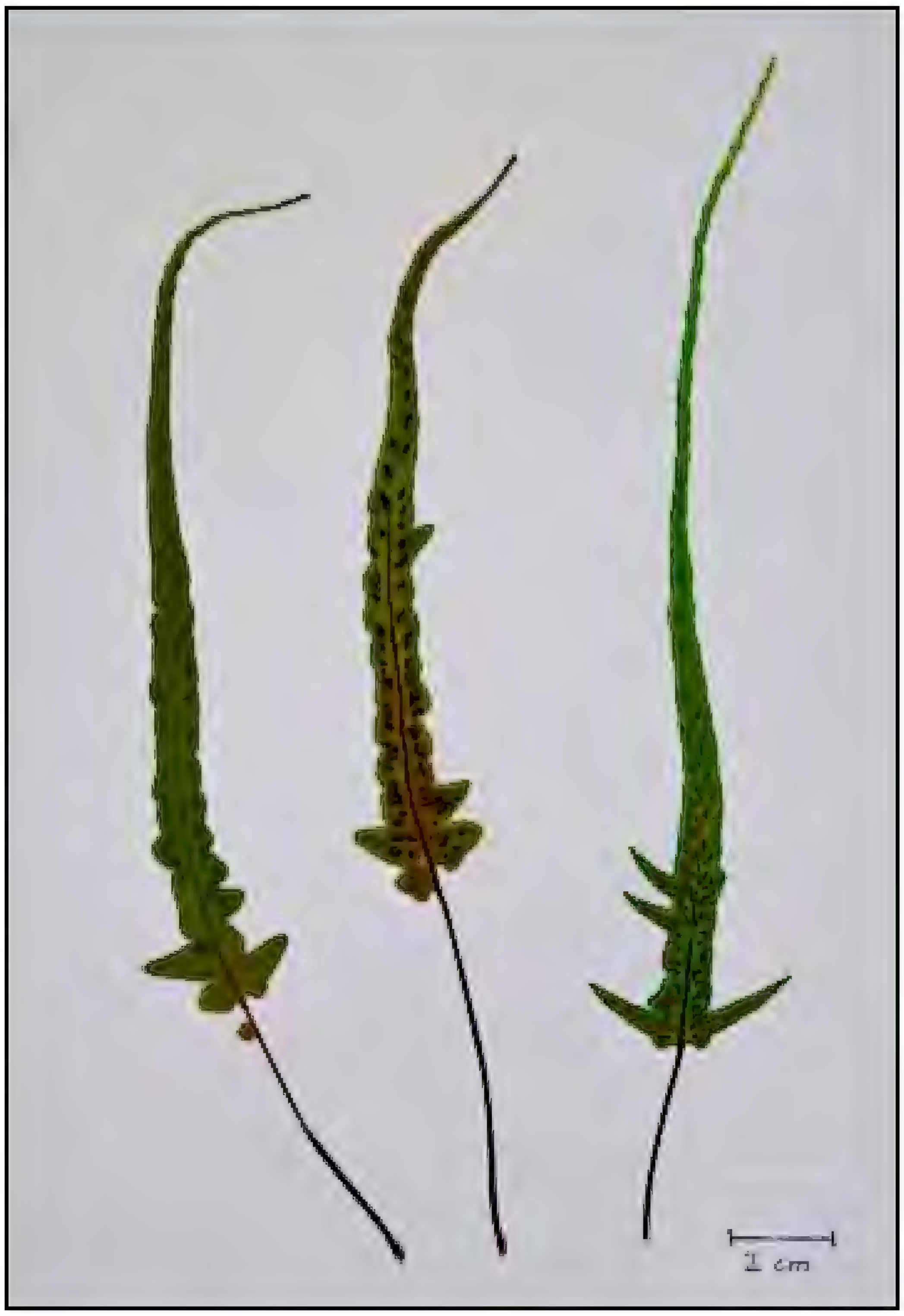

Fig. 12. *Asplenium rhizophyluum* x *tutwilerae*, average frond form and size of adult plant, length of the longest frond is 23cm, with bulbils removed

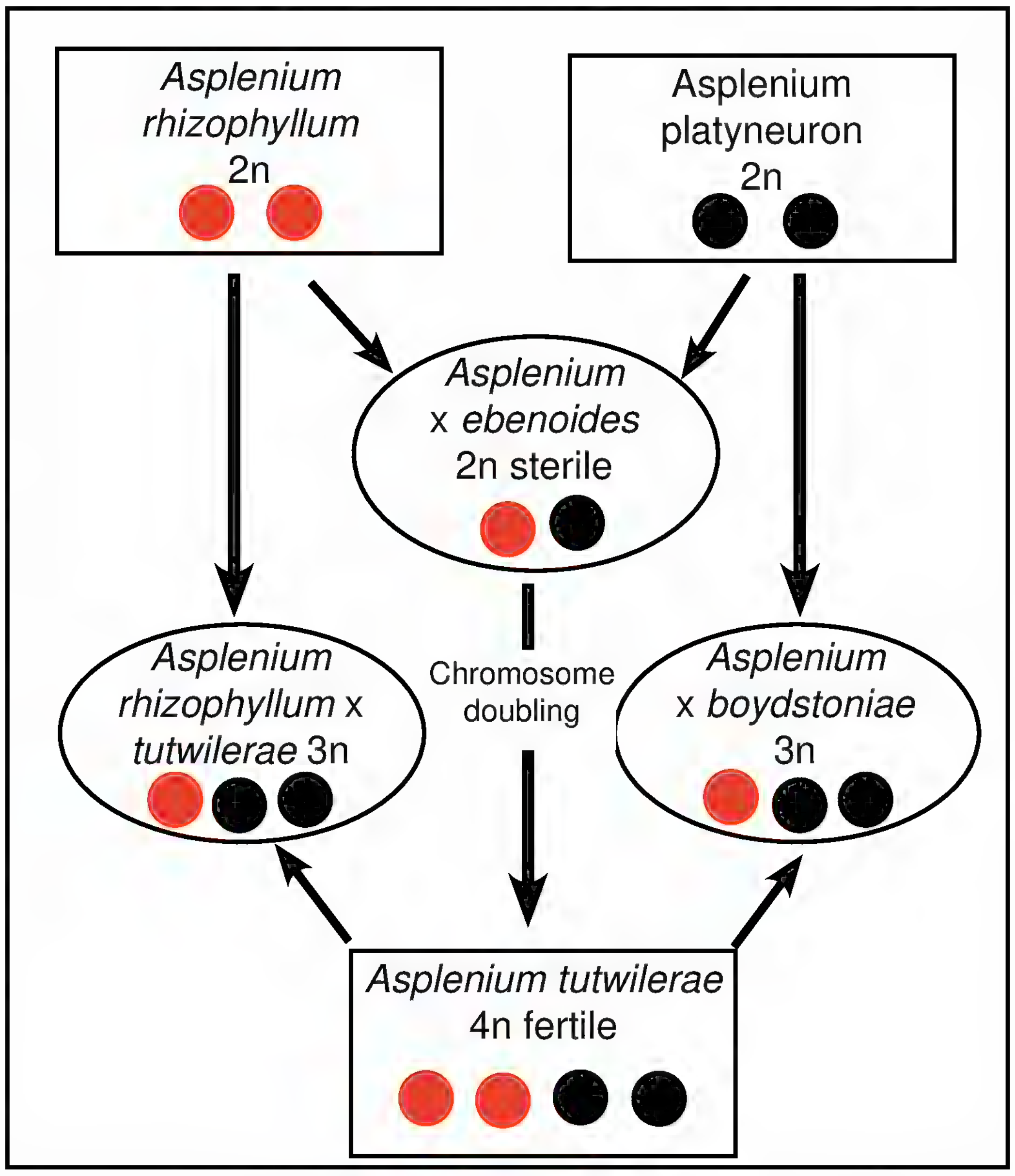
Asplenium rhizophyllum 2n
Asplenium platyneuron 2n
Asplenium x ebenoides 2n sterile
Chromosome doubling
Asplenium rhizophyllum x tutwilerae 3n
Asplenium x boydstoniae 3n
Asplenium tutwilerae 4n fertile

Fig. 13. The *Asplenium rhizophyllum - platyneuron* complex. The triploid backcrosses are all sterile.

References:

Keener, Brian R.; Davenport, Lary L. (2007): A new name for the well-known Asplenium (Aspleniaceae) from Hale County, Alabama. *Journal of the Botanical Research Institute of Texas* 1: 103-108

Lellinger, David B. (1985): *A Field Manual of the Ferns & Fern-Allies of the United States & Canada*. Smithsonian Institution Press, Washington D.C.

Olsen, Sue (2007): *Encyclopedia of Garden Ferns*. Timber Press, Portland, Oregon

Thiemann R. (2014): Artificial Hybrids of *Asplenium*. *Pteridologist* Vol.6 Part1, pp 42-45.

Wagner, W.H. Jr. & Kathryn E. Boydston (1959): A New Hybrid from Artificial Cultures at Fernwood and its Relationship to a Peculiar Plant from West Virginia. *American Fern Journal* 48(4): 146-159

Wikipedia: Keywords Asplenium tutwilerae, Asplenium x ebenoides; also more literature specifications there

Some Garden Ferns we Ought to be Growing in the UK

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In July 2018 several BPS members were fortunate enough to go on a fern tour of Dutch and Belgian gardens organised by the Dutch Fern Society. This was a truly memorable trip for a number of reasons – the friendliness, hospitality and knowledge of our hosts showing us around their gardens, the excellent weather, and, as usual, the good company of BPS members. However, one of the things that also struck me was the amazing variety of ferns we rarely see in UK gardens. Considering the Netherlands and Belgium are virtually on the same latitude as my garden in East Anglia, and it is only about 150 miles (240 km) as the crow flies between Norwich and Amsterdam, it seems to me that these other varieties could, and should, be grown in the UK. So what follows are some descriptions and photographs of the ferns we saw that particularly caught my fancy. Some of the photographs show ferns growing *in situ* whereas others show trays or pots of sporelings ready to be planted out. I have chosen a couple of dozen ferns to highlight, but there were a lot of others, and my colleagues on the trip may well have different favourites. Many of the ferns do not have the new RHS hardiness rating, so I have used the USDA system (with thanks mainly to Sue Olsen's Encyclopedia of Garden Ferns and Martin Rickard's Plantfinder's Guide).

Arachniodes simulans **(Fig. 1) and** ***Arachniodes webbiana*** **(Fig. 2)**

Most of us will be familiar with the widely-available *Arachniodes standishii* and the more-elaborate *Arachniodes davalliaeformis,* but these other two merit attention. Quite different in appearance to the ones we're used to, *Arachniodes simulans* is from the Far East. I couldn't find a minimum USDA hardiness rating, but a Swiss seller on the internet describes it as a wintergreen, hardy fern. *Arachniodes webbiana* is a Madeiran native, and has a minimum USDA hardiness rating of Zone 9 (down to -7°C).

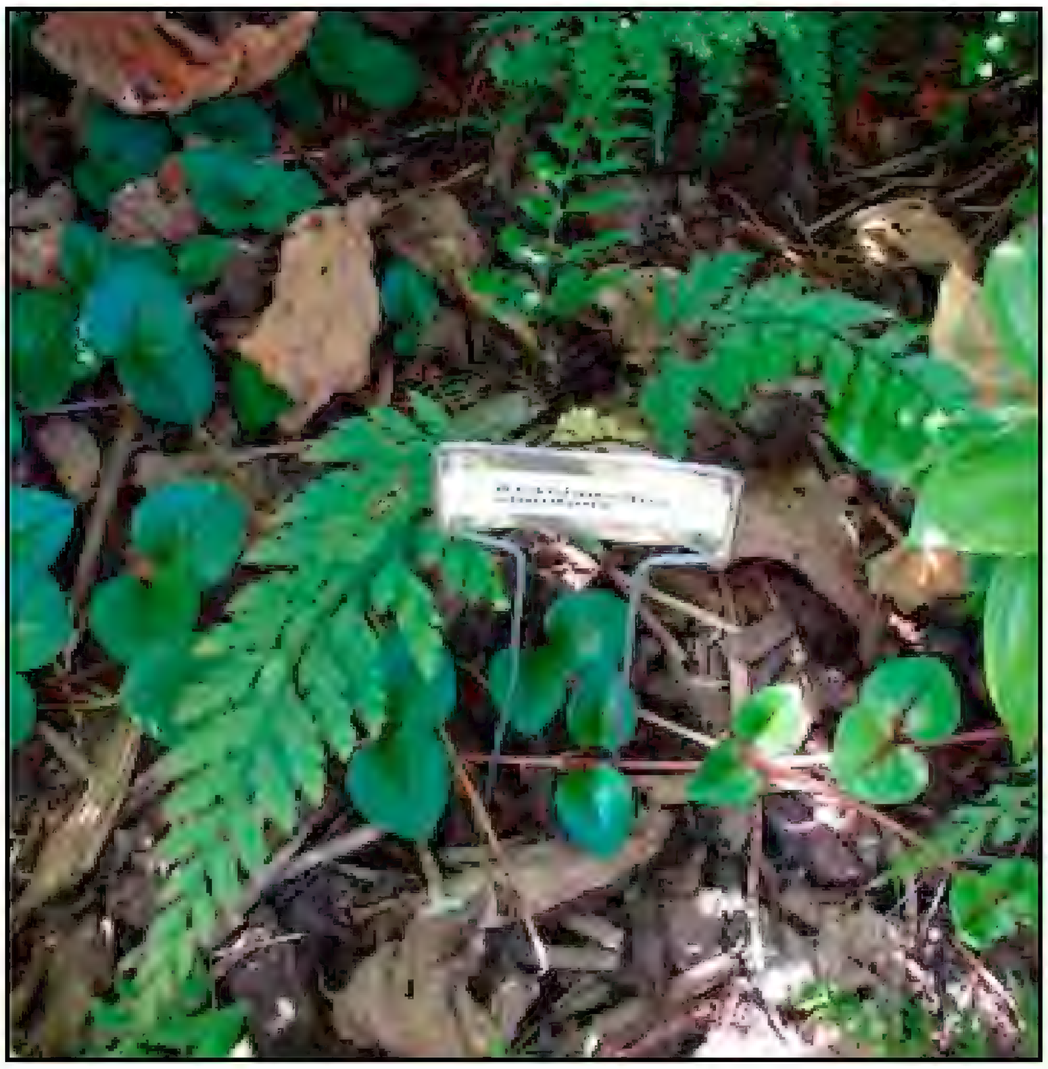

Fig. 1. *Arachniodes simulans*

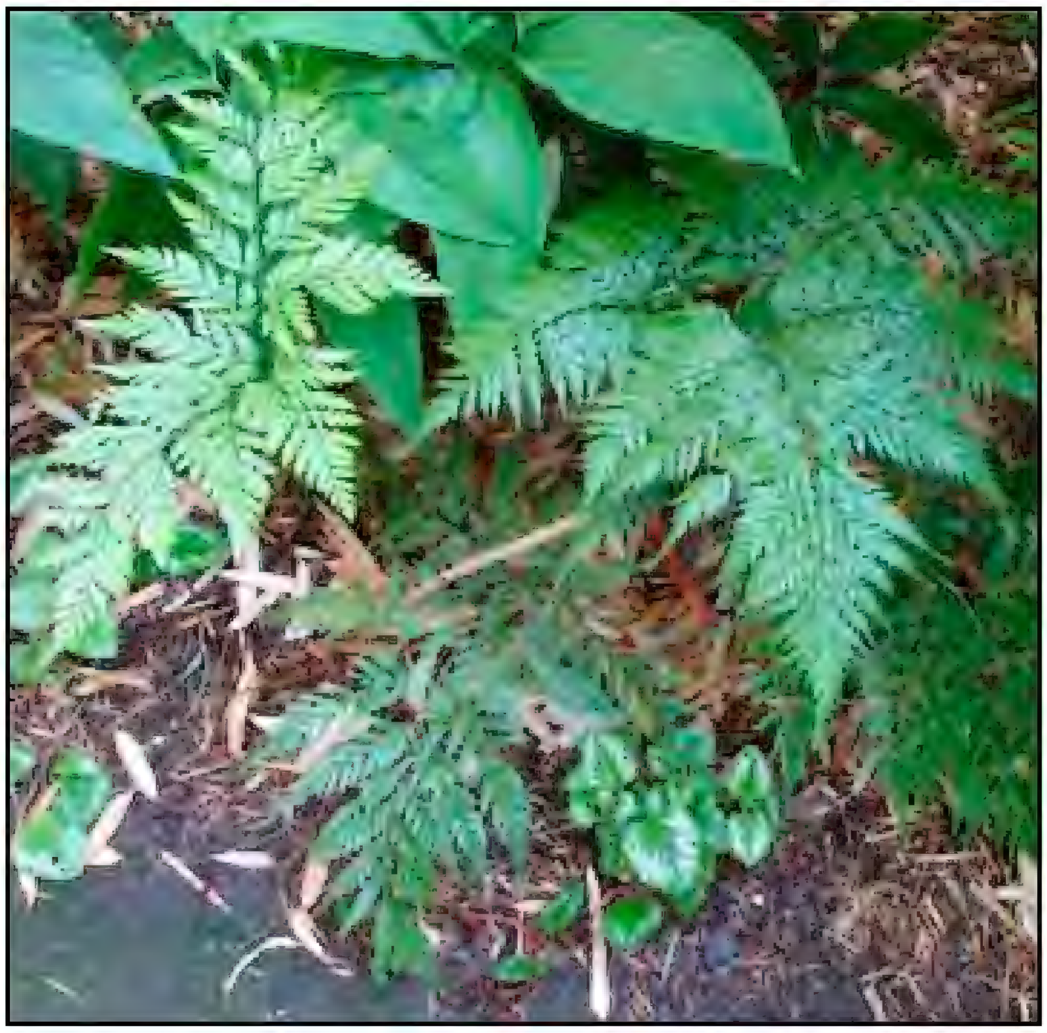

Fig. 2. *Arachniodes webbiana*

Athyrium alpestre **(Fig. 3)**

The name suggests "from the Alps", but this was growing happily in the Dutch lowlands. Its synonym is *A. distentifolium*. An attractive deciduous Lady Fern, it should grow to just over 2 feet in moist acid compost and has a minimum USDA hardiness rating of Zone 5 (down to -29°C).

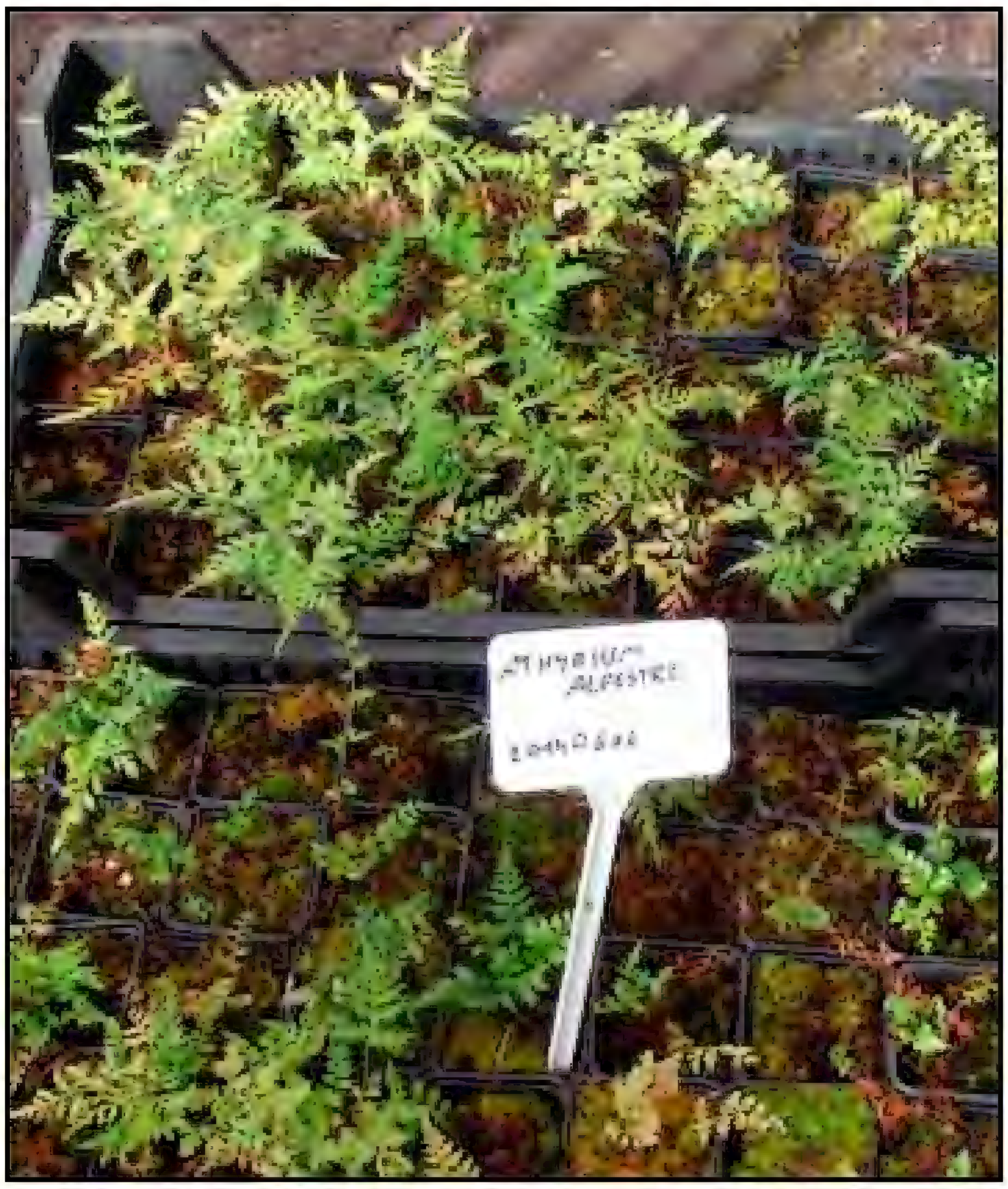

Fig. 3. *Athyrium alpestre*

Some Garden Ferns we Ought to be Growing in the UK

Cheilanthes fragrans **(Fig. 4)**

We saw several Cheilanthes*,* but this one I thought particularly attractive. The 'modern' name is *C. pteridioides* but it has also been known as *C. acrostica*. I've never had much success with Cheilanthes, but this evergreen fern is one I'd like to try in my newly-created rock garden. It has a minimum USDA hardiness rating of Zone 8 (down to -12°C).

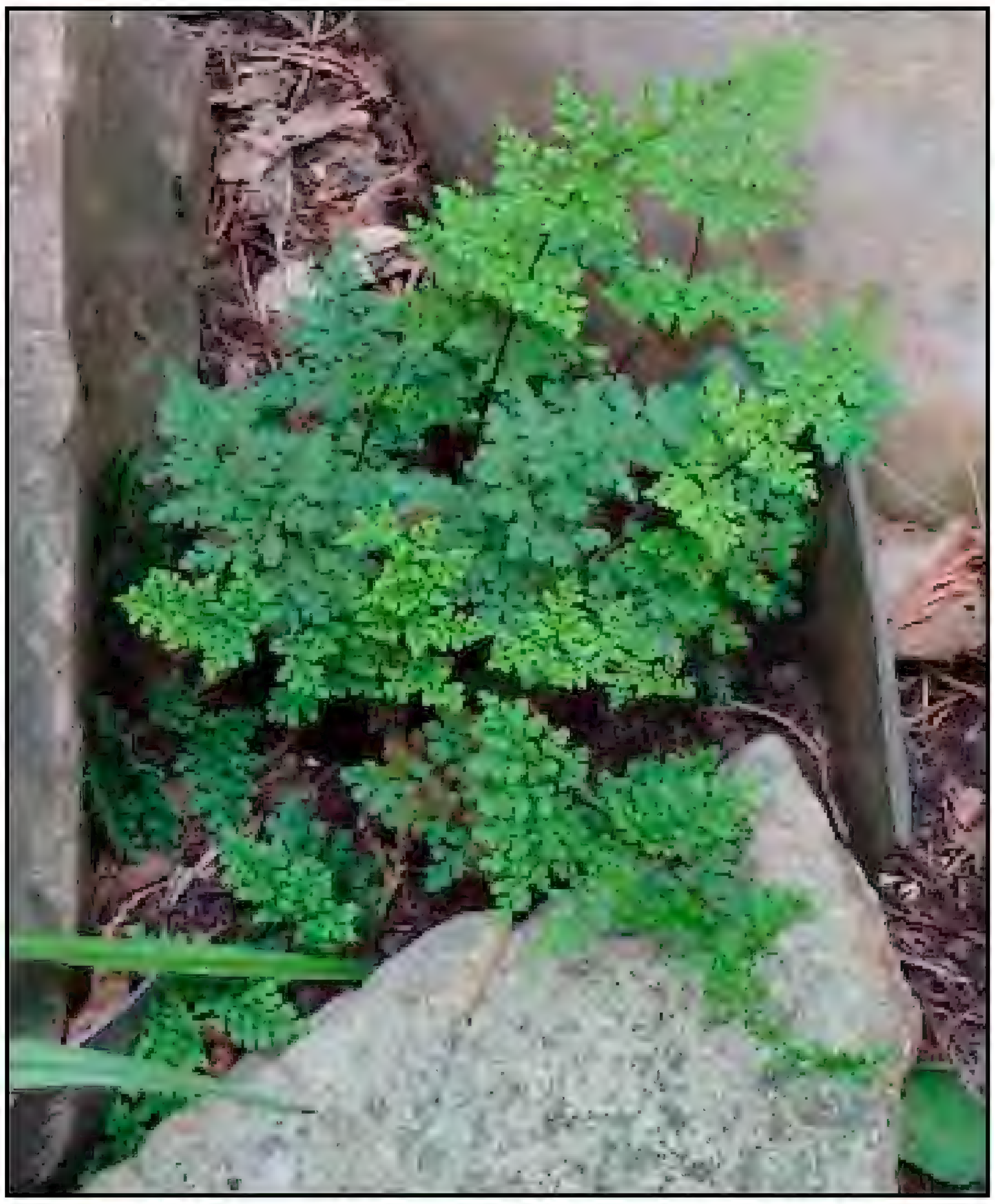

Fig. 4. *Cheilanthes fragrans*

Cyrtomium hookerianum **(Fig. 5)**

This is a true "monster" of a Cyrtomium, with broad individual pinnae several centimetres long. We saw a number of different Cyrtomiums, often unnamed, and this particular one was growing in a couple of the gardens we visited, usually in damp shade. A native of Japan, it is evergreen and has a lower USDA hardiness rating of Zone 6 (down to -23°C) with protection.

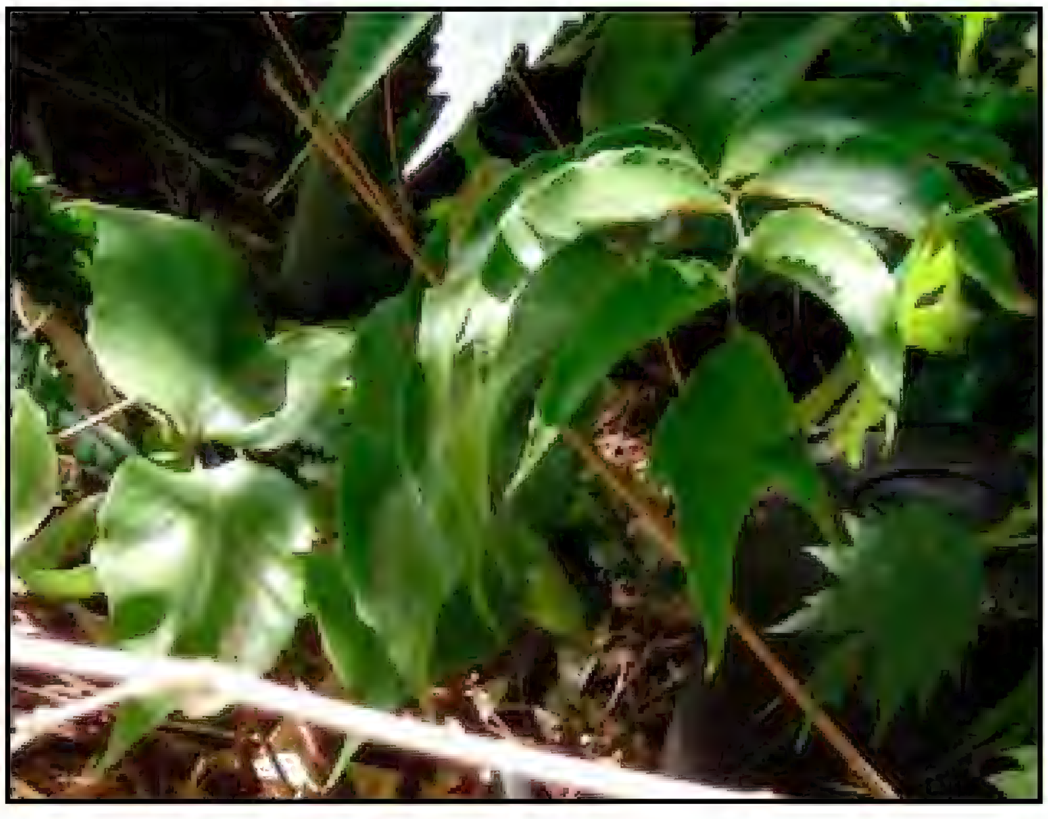

Fig. 5. *Cyrtomium hookerianum*

Deparia pterorachis **(Fig. 6)**

Deparia in general probably merit more attention than they get in UK gardens, and I've picked out *Deparia pterorachis* as something a bit different. A native of the Far East, it is known as the "Giant Tapering Glade Fern", and should grow to well over 3 feet high. It is deciduous and would probably prefer a moist, humus-rich sunny position. I couldn't find a USDA hardiness rating, but one internet reference said it was hardy down to -39°C. The fleshy pale yellow-green stipe is particularly noteworthy.

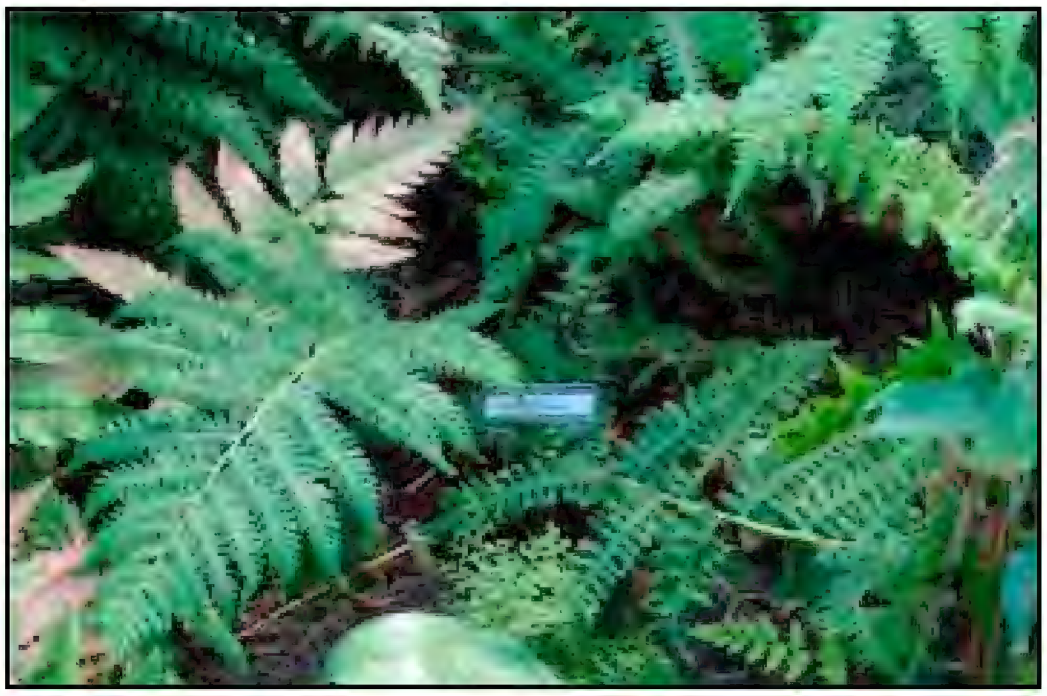

Fig. 6. *Deparia pterorachis*

Dryopteris (Figs. 7 - 15)

As with the Polystichums later in this article, Dryopteris were as widely grown in the gardens we visited as they are in the UK. However, with the large variety of different species, I had a hard job editing down my list.

Dryopteris caucasica **(Fig. 7)**

This is a deciduous fern growing to about 3 feet high. Being one of the parents of *D. filix-mas,* it should grow in similar conditions. It has a minimum USDA hardiness rating of Zone 5 (down to -29°C).

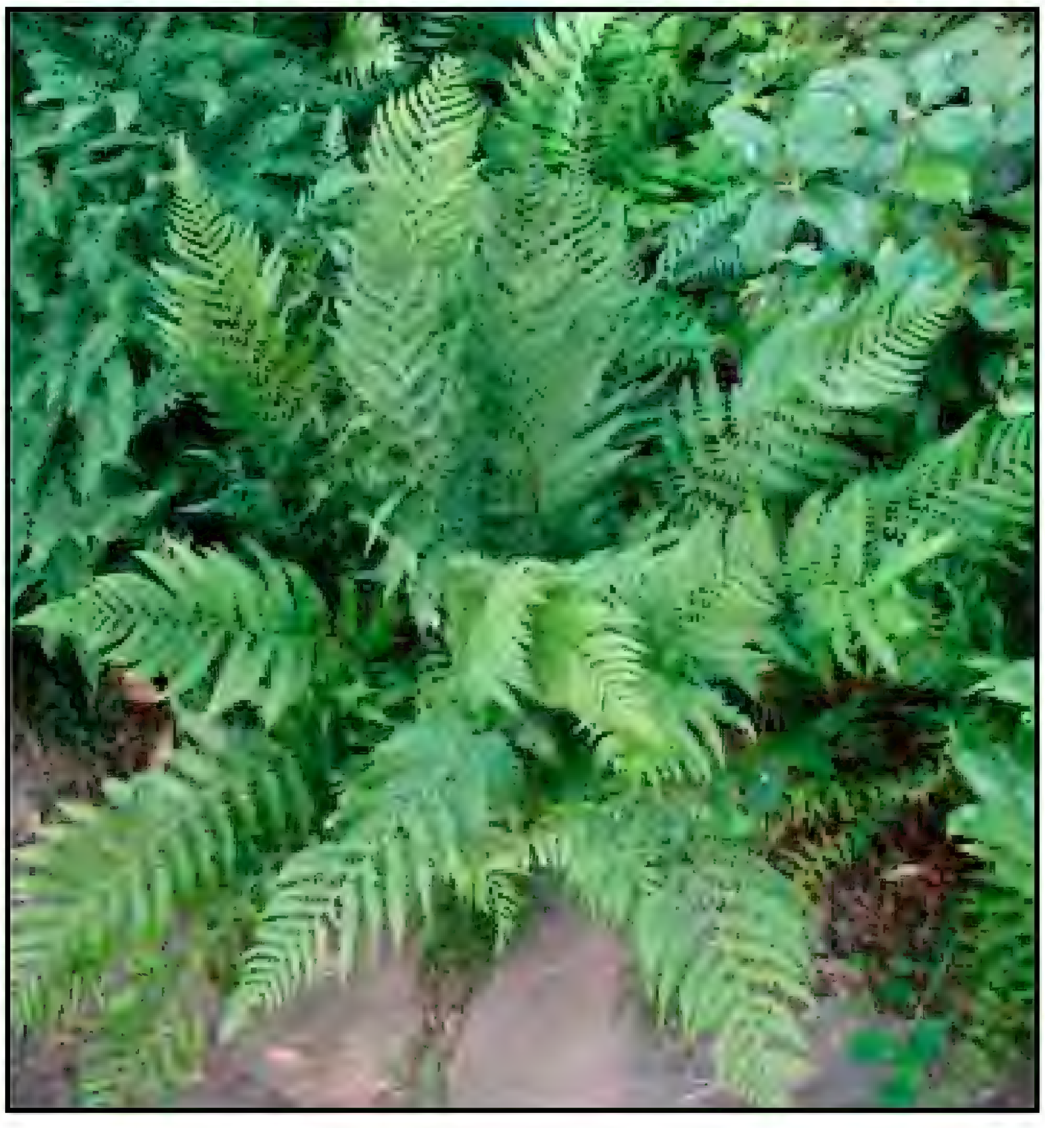

Fig. 7. *Dryopteris caucasica*

Some Garden Ferns we Ought to be Growing in the UK

Dryopteris championii (Fig. 8)

Named after John Champion rather than the appearance of this attractive fern. It is evergreen, grows to about 3 feet high and is a forest native of East Asia. I was surprised to find it available for purchase through a number of the sellers in the RHS Plant Guide. It has a minimum USDA hardiness rating of Zones 5 (down to -29°C).

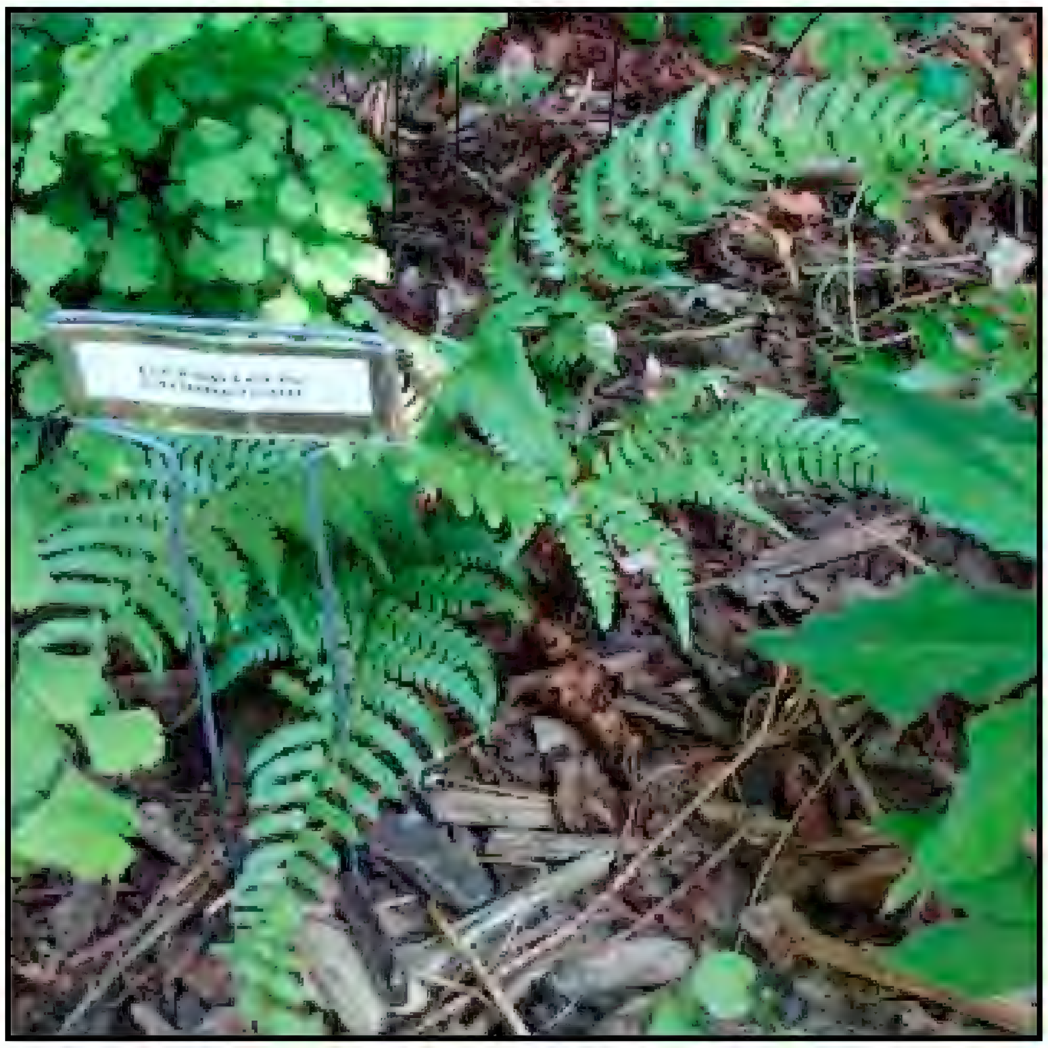

Fig. 8. *Dryopteris championii*

Dryopteris clintoniana (Fig. 9)

Another Dryopteris available for purchase through a number of sellers in the RHS Plant Guide. The attractiveness of this dimorphic fern is due to its parentage - *Dryopteris cristata* and *D. goldiana*. Endemic in North America, it is semi-evergreen and has a minimum USDA hardiness rating of Zone 3 (down to -40°C). It is one I'll definitely be trying in my garden.

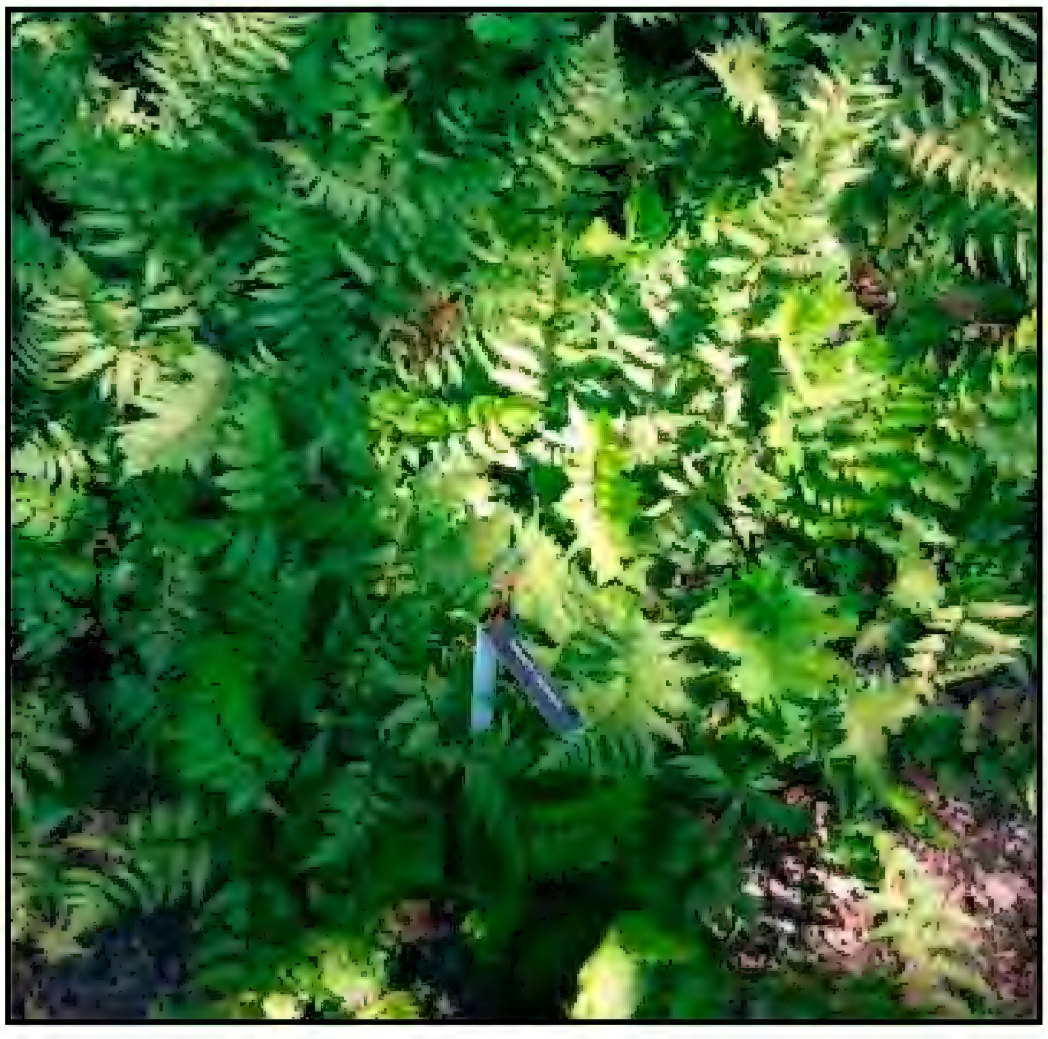

Fig. 9. *Dryopteris clintoniana*

Dryopteris filix-mas 'Furcans' (Fig. 10)

As shown in the photograph, we saw this as an impressive spread in one of the gardens. It is the only cultivar in my list, sometimes not unsurprisingly called "the forked Male Fern". Again available through several sellers, it should be just as reliable and hardy as its parent and grown in similar conditions.

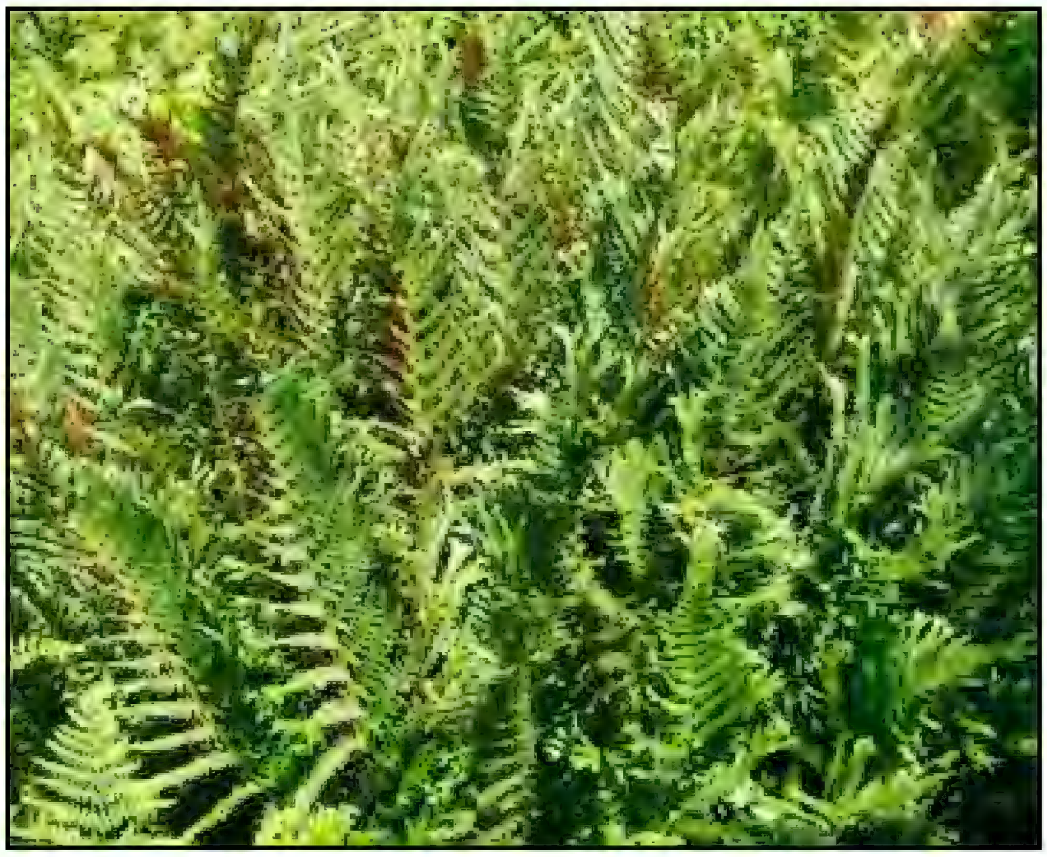

Fig. 10. *Dryopteris filix-mas 'Furcans'*

Dryopteris formosana (Fig. 11)

This is a really lovely Dryopteris and we saw it in a number of the gardens. It should grow to around 2 feet, with glossy, evergreen fronds, and should be drought tolerant. Notably, the lower pinnules are very long. It has a minimum USDA hardiness rating of Zone 6 (down to -23°C). This is a definite one to try, if you can get hold of it, or grow from spore from the BPS spore exchange.

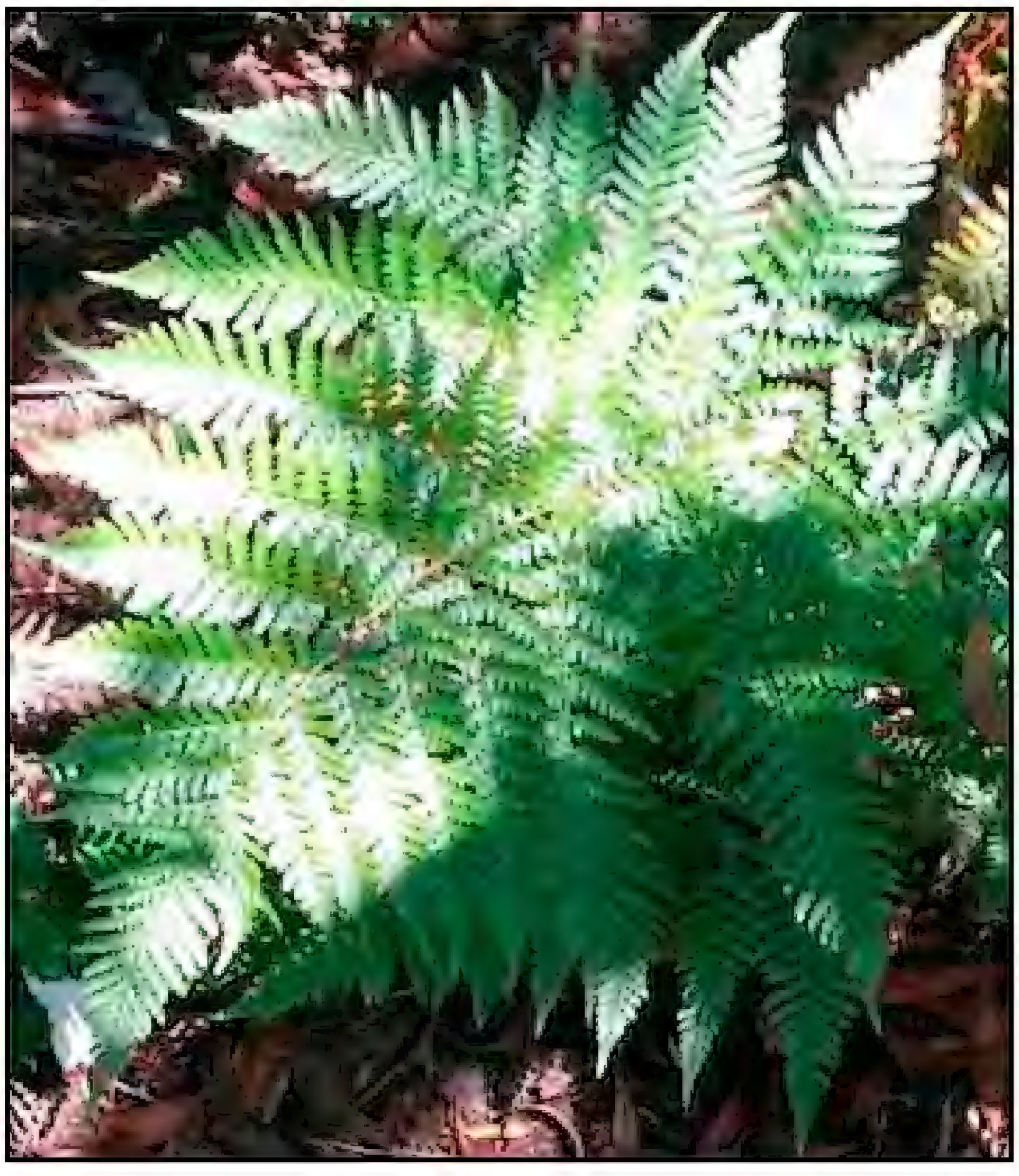

Fig. 11. *Dryopteris formosana*

Some Garden Ferns we Ought to be Growing in the UK

Dryopteris monticola (Fig. 12)

Some believe this to be a sub-species of *D. goldiana,* to which it appears similar, but it is worthy of its own place in the garden. This deciduous fern has a minimum USDA hardiness rating of Zone 3 (down to -40°C) and should grow readily, with fronds up to 3 feet long, in moist soil and light shade.

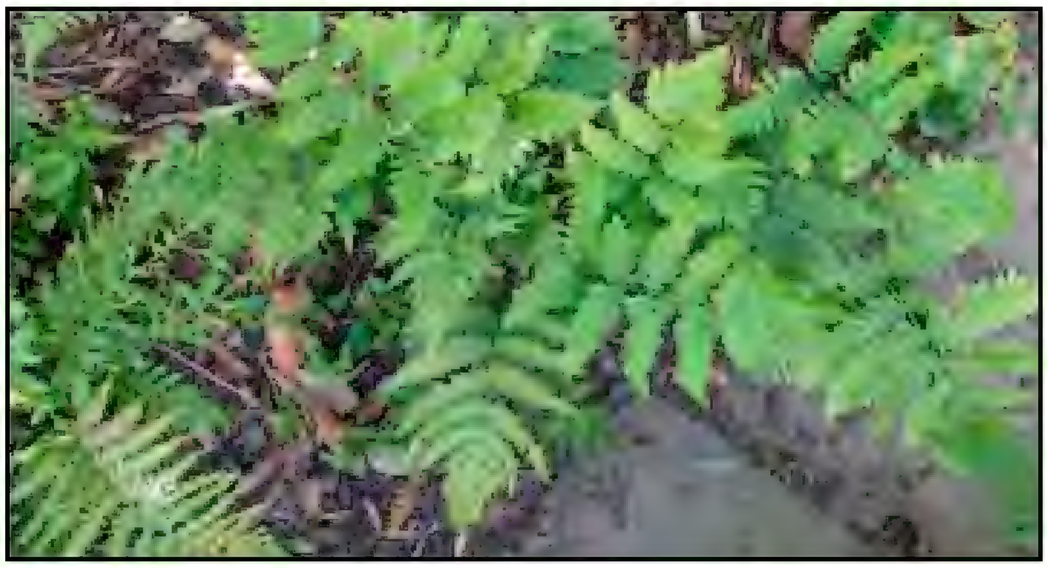

Fig. 12. *Dryopteris monticola*

Dryopteris polylepis (Fig. 13)

This good looking Dryopteris is a native of East Asian woodlands and has a dark rachis and distinctive pinnae. It should be drought tolerant and remain evergreen with fronds up to 2 feet long. It has a minimum USDA hardiness rating of Zone 6 (down to -23°C).

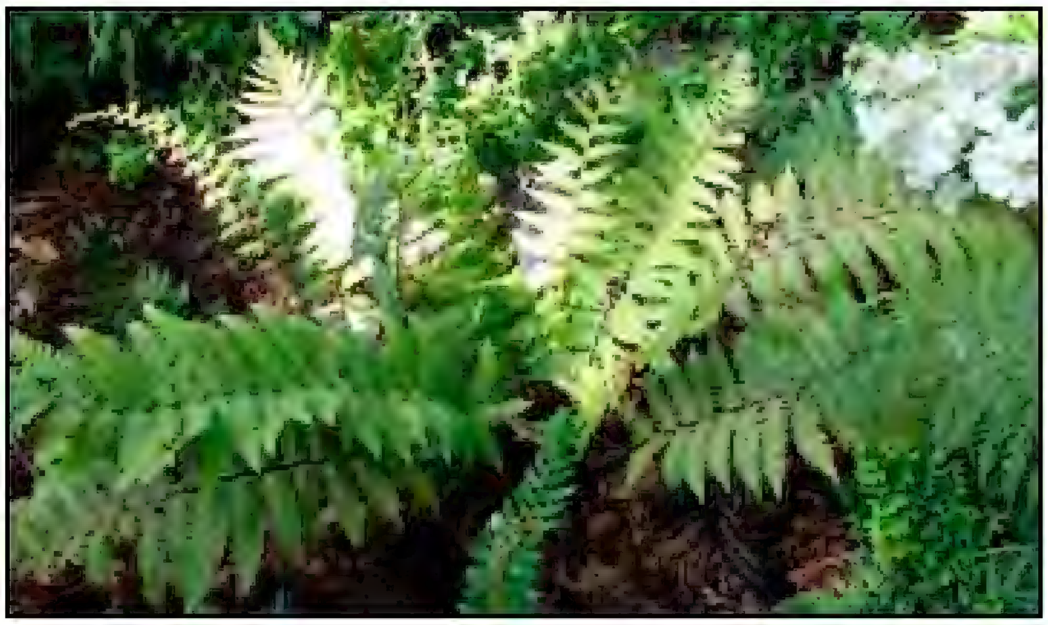

Fig. 13. *Dryopteris polylepis*

Dryopteris purpurella (Fig. 14)

Similar to the more widely available *D. erythrosora*, but at times with a distinct purple hue. Try it for yourself using spore from the BPS spore exchange and grow it in similar conditions to *D. erythrosora*. It should remain evergreen, with fronds to over 3 feet long. It has a minimum USDA hardiness rating of Zone 6 (down to -23°C).

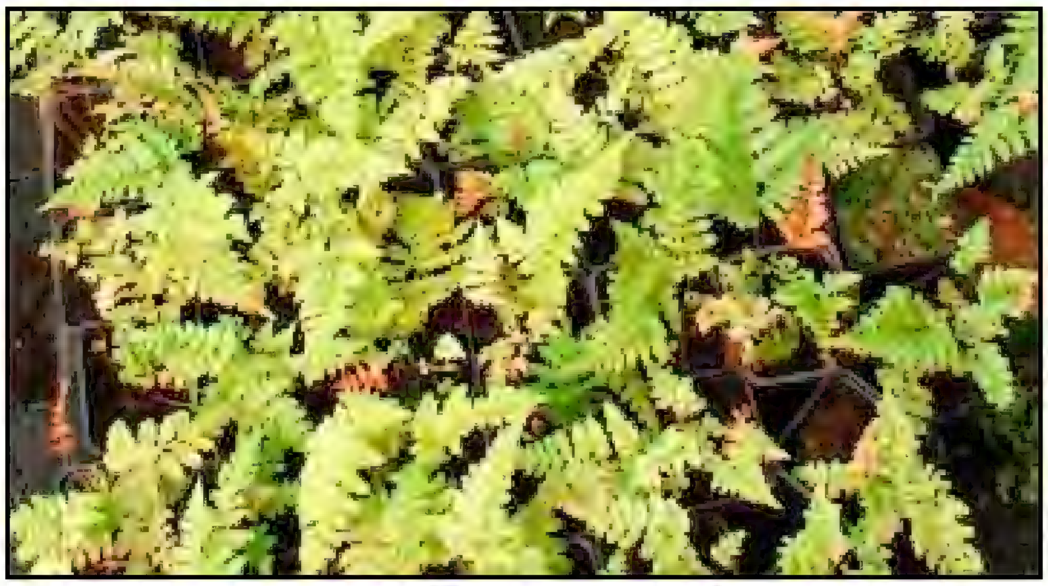

Fig. 14. *Dryopteris purpurella*

Dryopteris saxifraga (Fig. 15)

Apparently from rocky mountainous areas of the Far East, this evergreen fern should grow to about 2 feet high in well-drained soil. It has a minimum USDA hardiness rating of Zones 5 (down to -29°C).

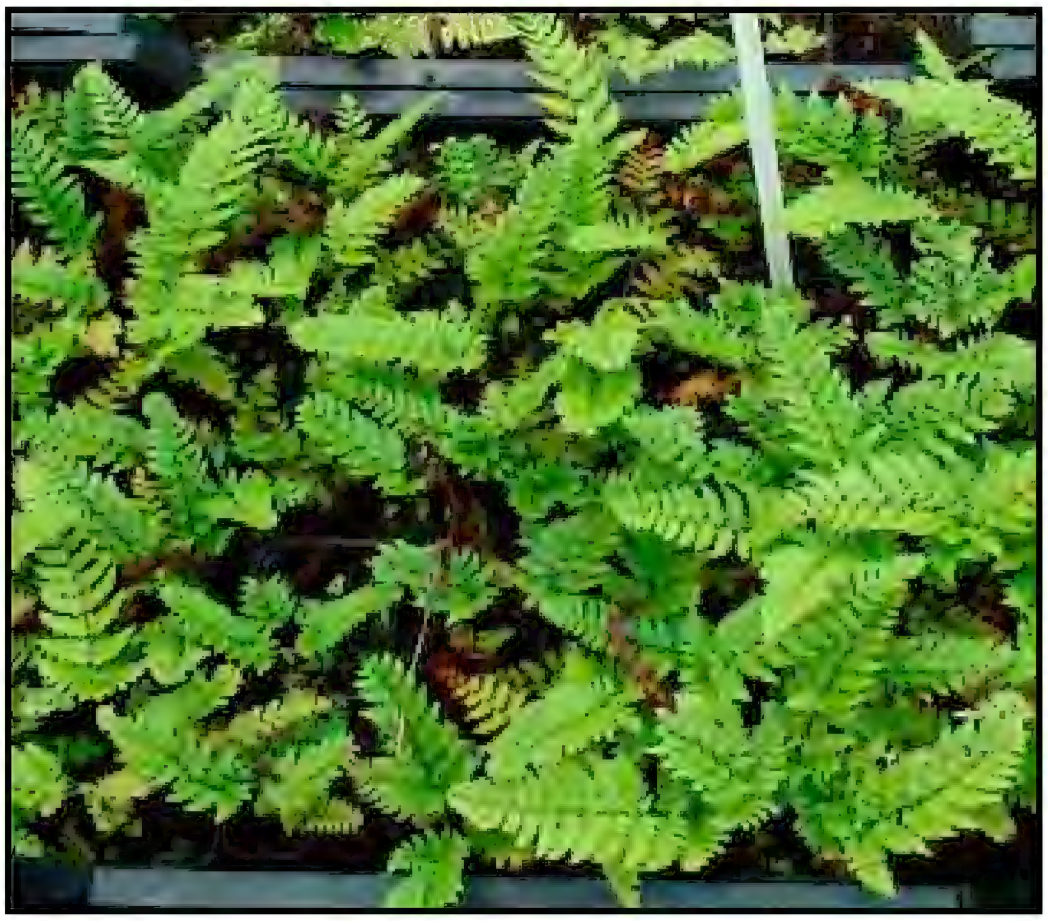

Fig. 15. *Dryopteris saxifraga*

Hypolepis millefolium (Fig. 16)

One of the really lovely forms of Hypolepis, this deciduous New Zealand native should give a good, spreading, ground cover of emerald green - as seen in the photograph. It will probably prefer more acidic well-drained soils, and grows to a height of around 2 feet. It has a lower USDA hardiness rating of Zone 7 (down to -18°C). The RHS lists several suppliers.

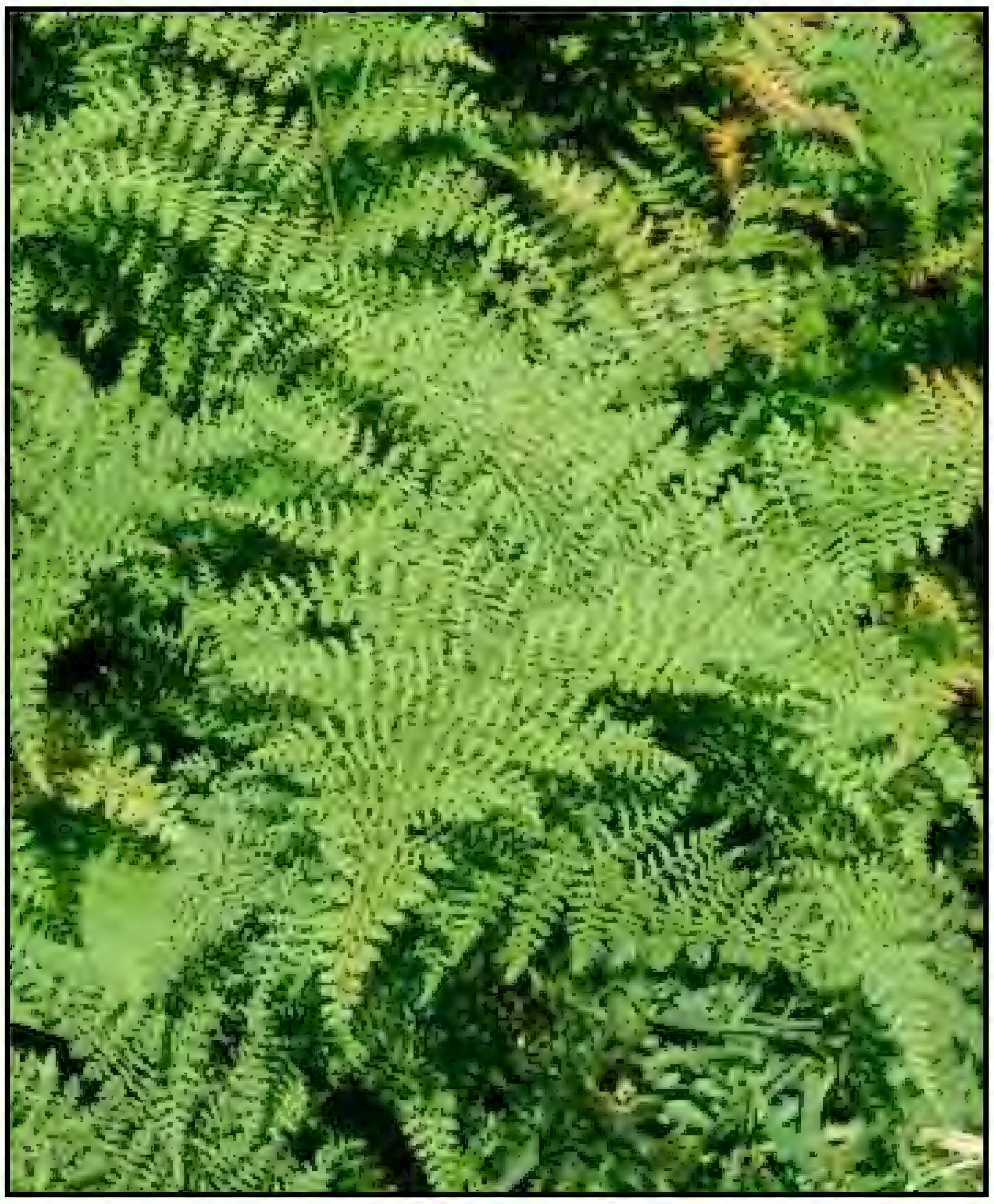

Fig. 16. *Hypolepis millefolium*

Osmunda lancea (Fig. 17)

This is an Osmunda I'd not come across before, but well worth seeking out. It is a low-growing (to about 1 foot) deciduous fern, and as with other Osmunda prefers damp conditions. The minimum USDA hardiness rating is Zone 6 (down to -23°C).

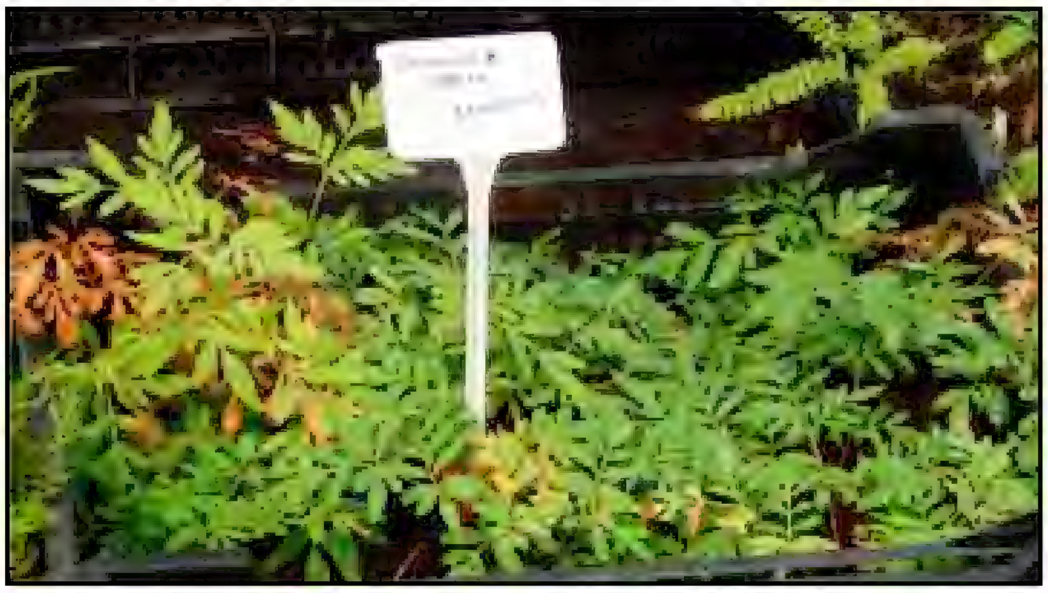

Fig. 17. *Osmunda lancea*

Polystichum (Figs. 18 - 24)

As with the Dryopteris above, Polystichums were well represented in the gardens we visited, but again with a number of unfamiliar varieties.

Polystichum biaristatum (Fig. 18)

From North India to Taiwan, this glossy fern should do well – if you can source it (I came across a couple of sites when searching the internet). It should grow to about 3 feet and is winter hardy to USDA hardiness rating of Zone 5 (down to -29°C).

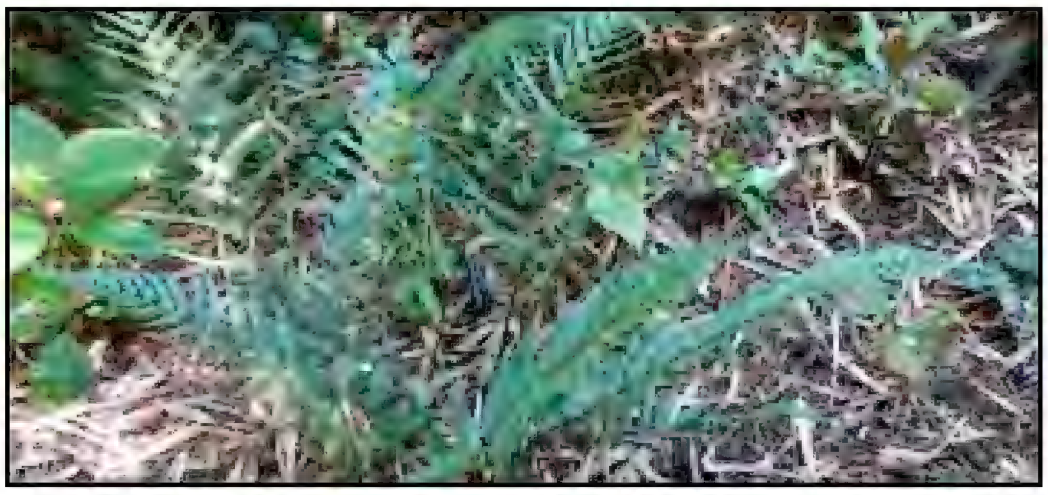

Fig. 18. *Polystichum biaristatum*

Polystichum lepidocaulon (Fig. 19)

This is a broad leaf evergreen fern growing to just over 1 foot tall. It spreads by bulbils on the ends of long whip-like frond runners, so plant where its bulbils can take root. Supposedly it has a lower USDA hardiness rating of Zone 8 (down to -12°C), but may need some winter protection.

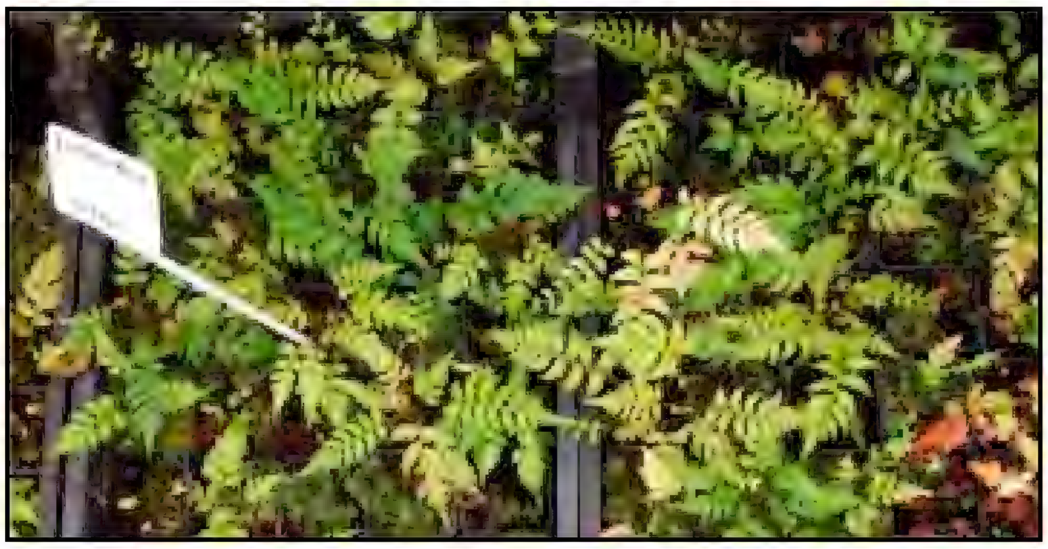

Fig. 19. *Polystichum lepidocaulon*

Polystichum retroso-paleaceum (Fig. 20)

A good looking, pale fresh green fern which is evergreen and should grow to about 3 feet high. It has a minimum USDA hardiness rating of Zone 5 (down to -29°C) and would prefer good humus-rich soil. Spores are available through the BPS spore exchange.

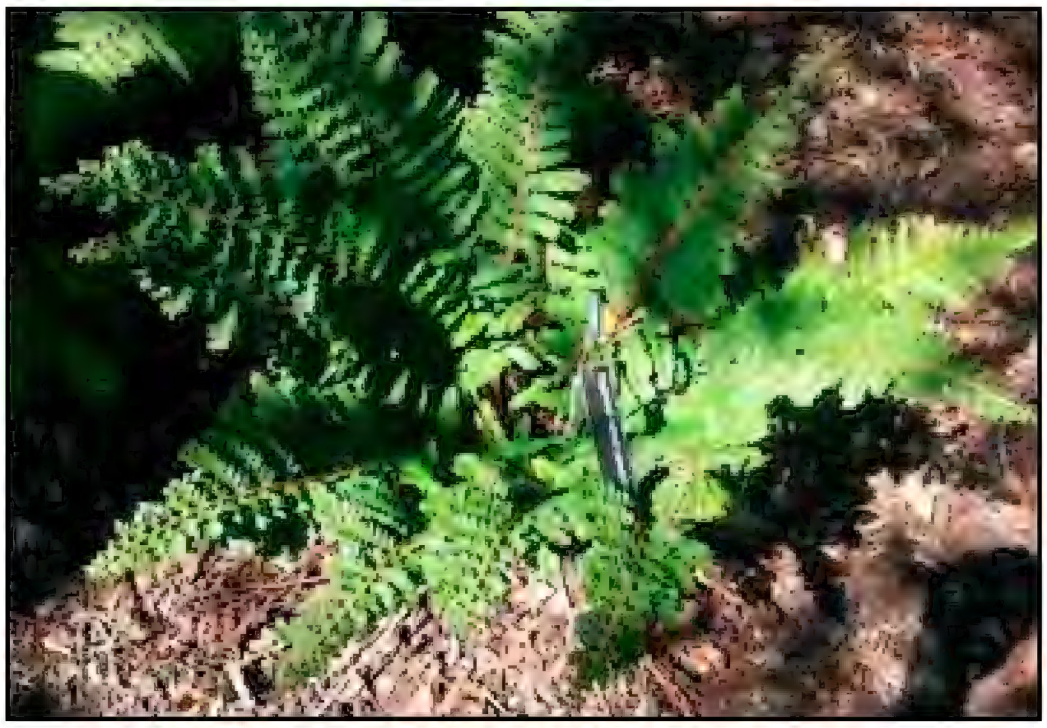

Fig. 20. *Polystichum retroso-paleaceum*

Polystichum stenophyllum (Fig. 21)

This is a delightful, small (to about 18 inches high) evergreen fern which would be suitable for a rock garden. It should be grown in humus-rich soil so that the tiny bulbils at the frond tips propagate. It has a minimum USDA hardiness rating of Zone 6 (down to -23°C), and spores are available through the BPS spore exchange.

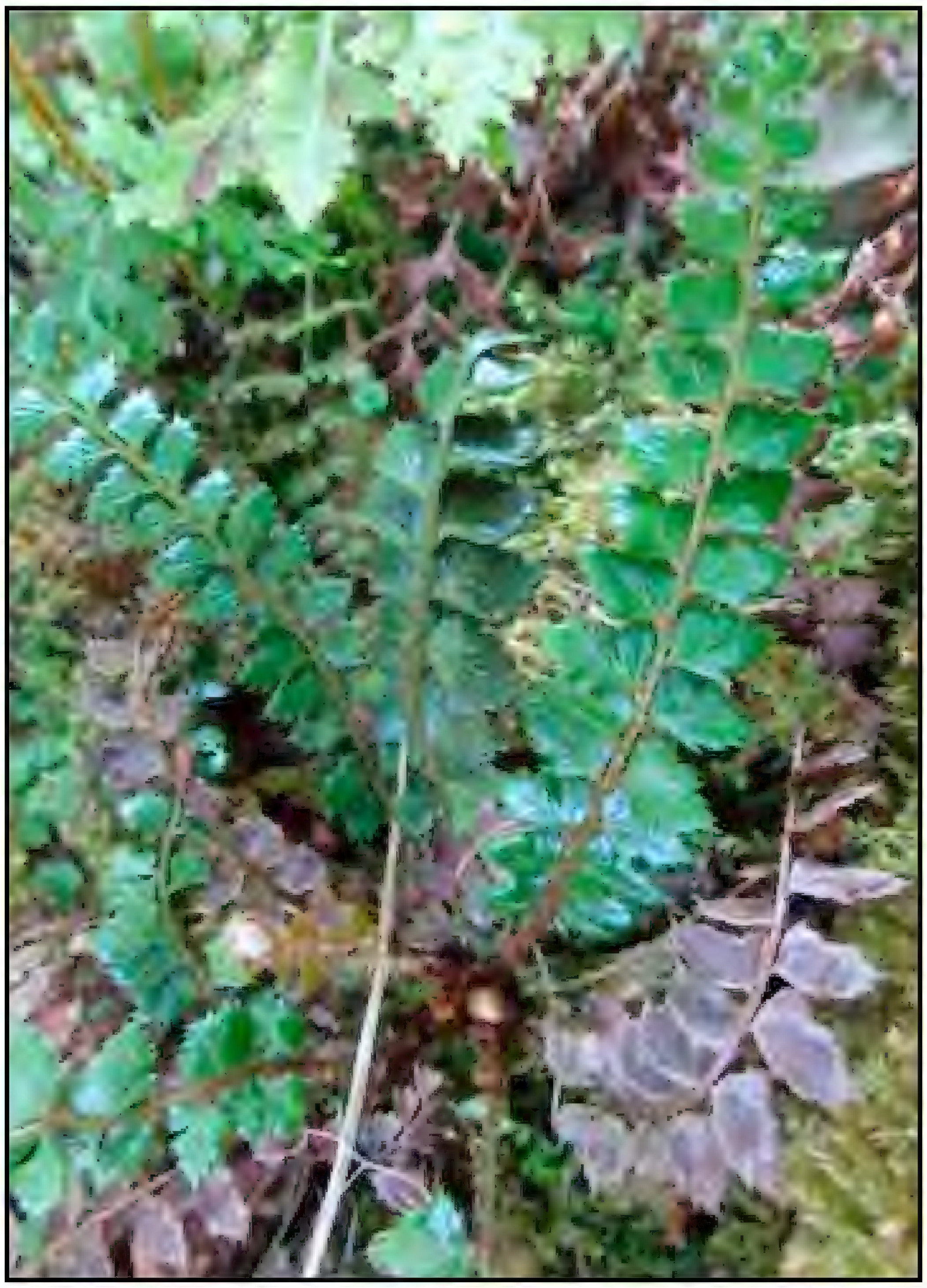

Fig. 21. *Polystichum stenophyllum*

Some Garden Ferns we Ought to be Growing in the UK

Polystichum thomsonii **(Fig. 22)**

A small (about 1 foot / 0.3m high) glossy fern preferring a rockier, shaly environment. It has a lower USDA hardiness rating of Zone 7 (down to -18°C), and unusually, it is a deciduous Polystichum.

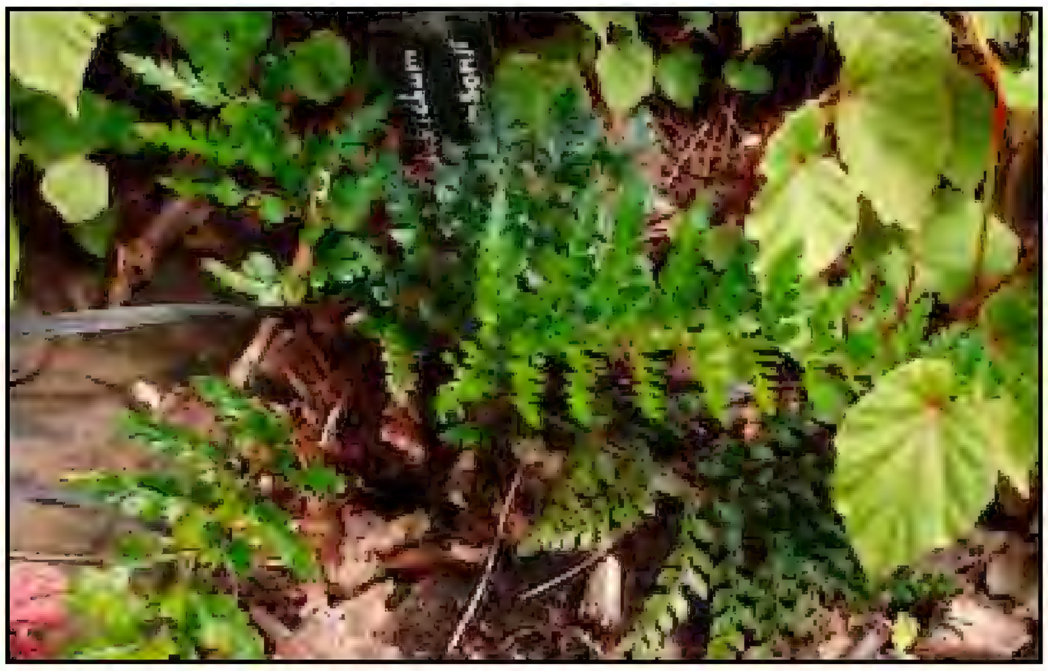

Fig. 22. *Polystichum thomsonii*

Polystichum xiphophyllum **(Fig. 23)**

This is another low growing (to about 18 inches high) glossy leaved evergreen fern from the Far East, the pinnae being distinctively shaped and with a deep mid vein. It has a minimum USDA hardiness rating of Zone 7 (down to -18°C) and would probably prefer humus-rich soil.

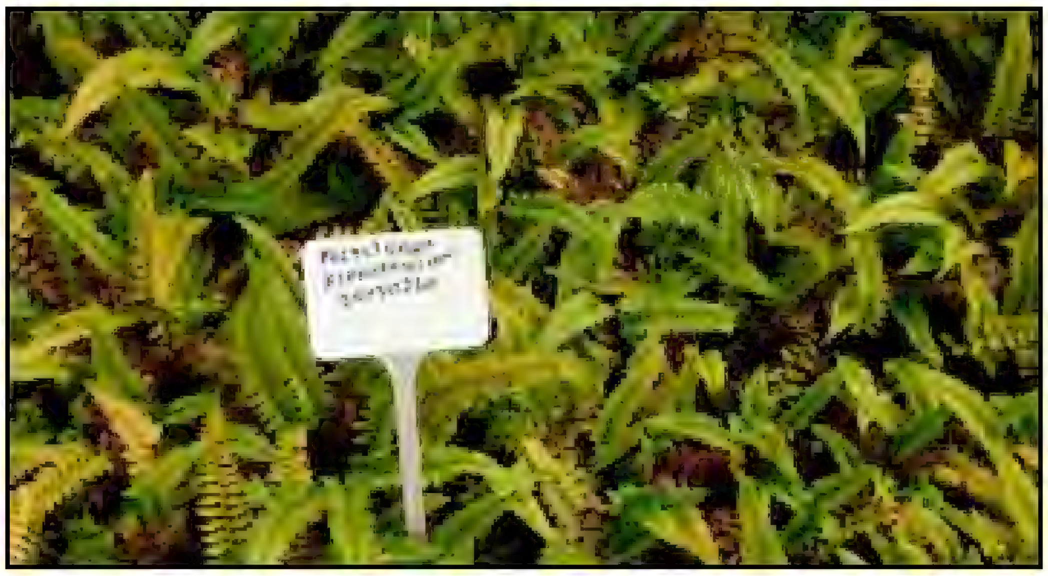

Fig. 23. *Polystichum xiphophyllum*

Polystichum yunnanense **(Fig. 24)**

From the Yunnan as the name suggests, this evergreen fern should grow to about 2 feet / 0.6m high. The mature pinnae have distinctive dotted indentations. It has a lower USDA hardiness rating of Zone 6 (down to -23°C) and it appears to be very tolerant of dry conditions and different soil types. Spore is available through the BPS spore exchange.

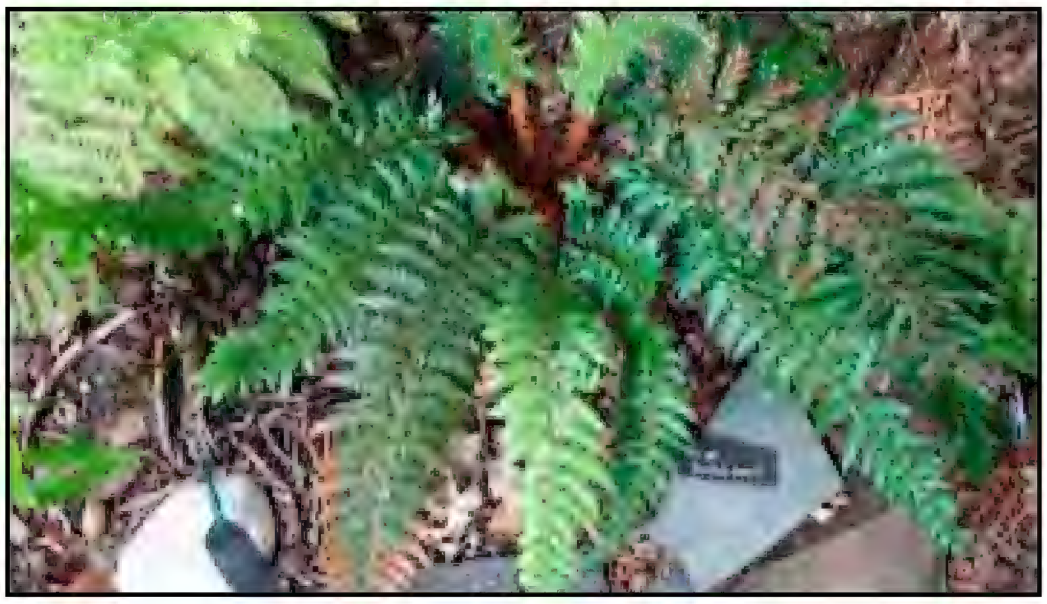

Fig. 24. *Polystichum yunnanense*

Thelypteris acuminata **(Fig. 25)**

As I live in East Anglia, I am familiar with the Marsh Fern (*Thelypteris palustris),* but this is a Thelypteris I had not come across before. Also a spreading fern, it comes from the Sichuan Province, China, and grows to about 20 inches tall with fronds about 6 inches at their widest. It is evergreen and has a minimum USDA hardiness rating of Zone 7 (down to -18°C). This would be well worth a try if you have the space and can source it.

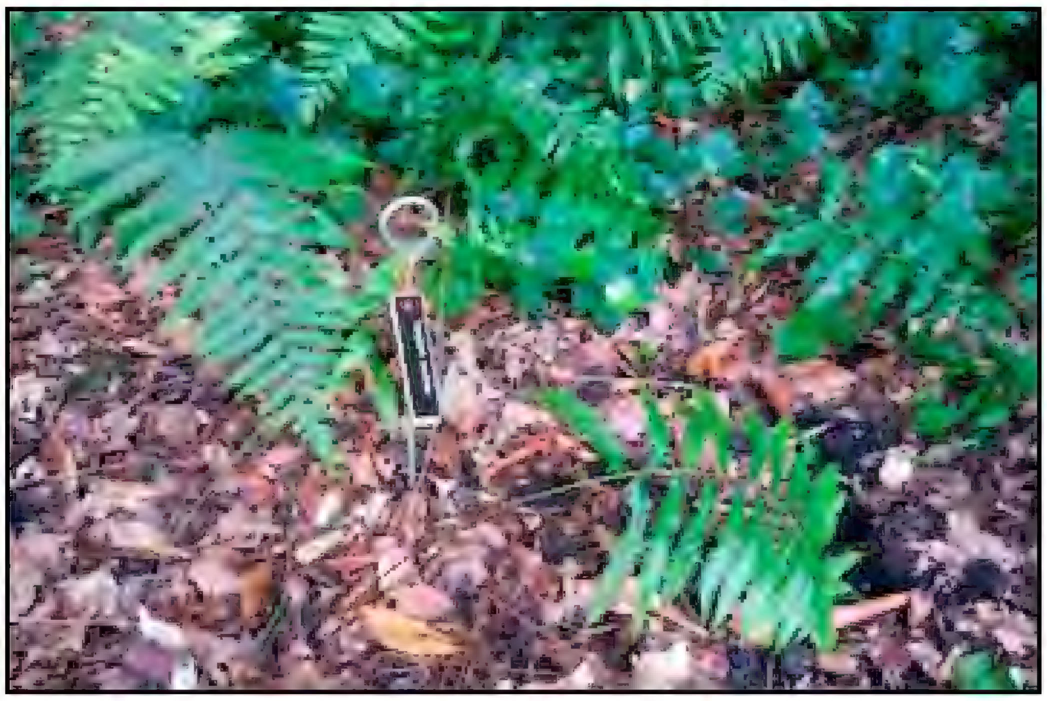

Fig. 25. *Thelypteris acuminata*

Woodsia polystichoides **(Fig. 26)**

I thought this was a particularly attractive little Woodsia, and one worth growing in moist, well-drained soil. It is deciduous, should grow to about 18 inches tall and has an RHS hardiness rating of H7 (< -20°C). Spores are available through the BPS spore exchange.

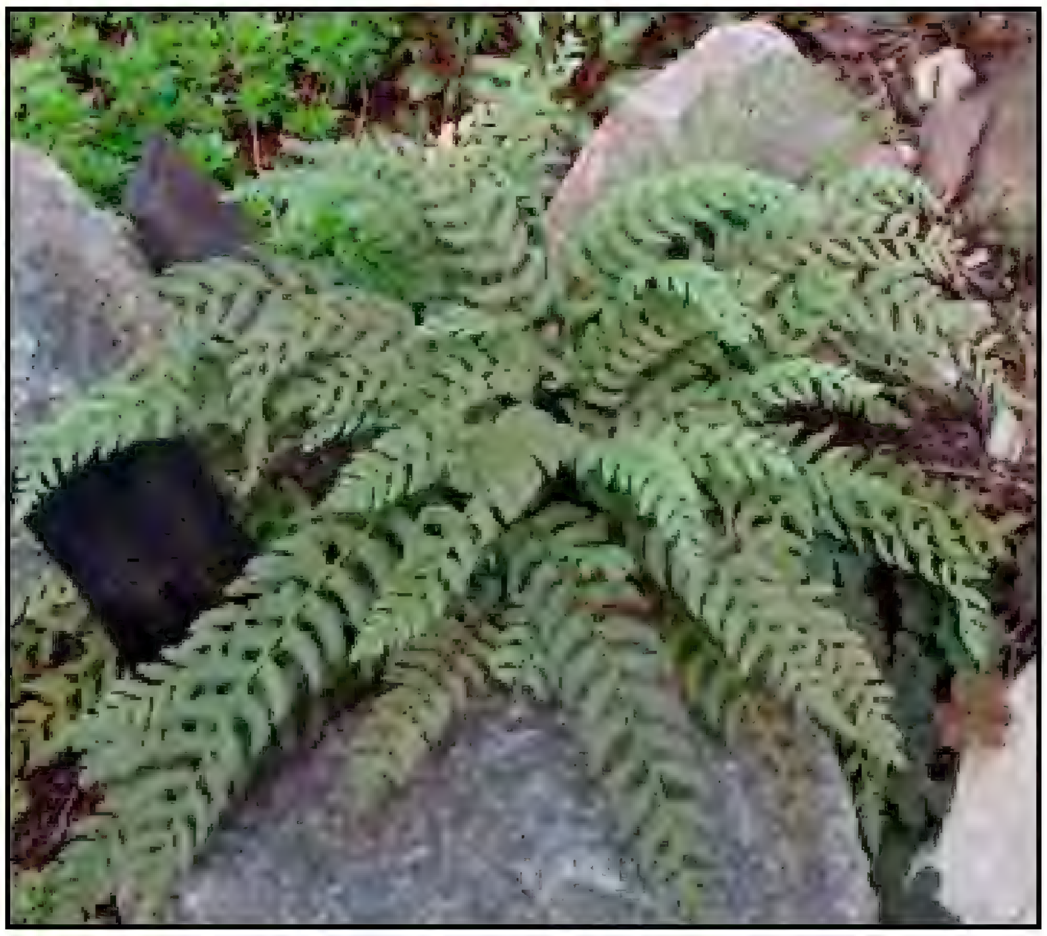

Fig. 26. *Woodsia polystichoides*

So, there you have it. A couple of dozen ferns to try anew, though some of you may have one or two already in your gardens. Some of the ferns appear easy to source, some very difficult and some you can try from spore from the BPS spore exchange. Most, as yet, do not have RHS Hardiness ratings, but based on the USDA system, all should tolerate our winters. Hopefully, from this article and further research on the internet, you'll be tempted to "have a go". I'd be very interested to hear how you get on.

Fern Lost and Found

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Athyrium filix-femina 'Acrocladon' has been re-found

This fascinating fern (Fig. 1), completely different in form to the lady ferns we see growing in woods and stream sides, was found by the roadside on a Yorkshire moor at Castle Howard by Mr. Monkman in 1860. Reginald Kaye grew it for decades and still had it in the 1960s. However I could not find anyone who had seen it in years. A group of us in the Cultivar group who go round gardens of old members looking for the lost varieties had not come across it either.

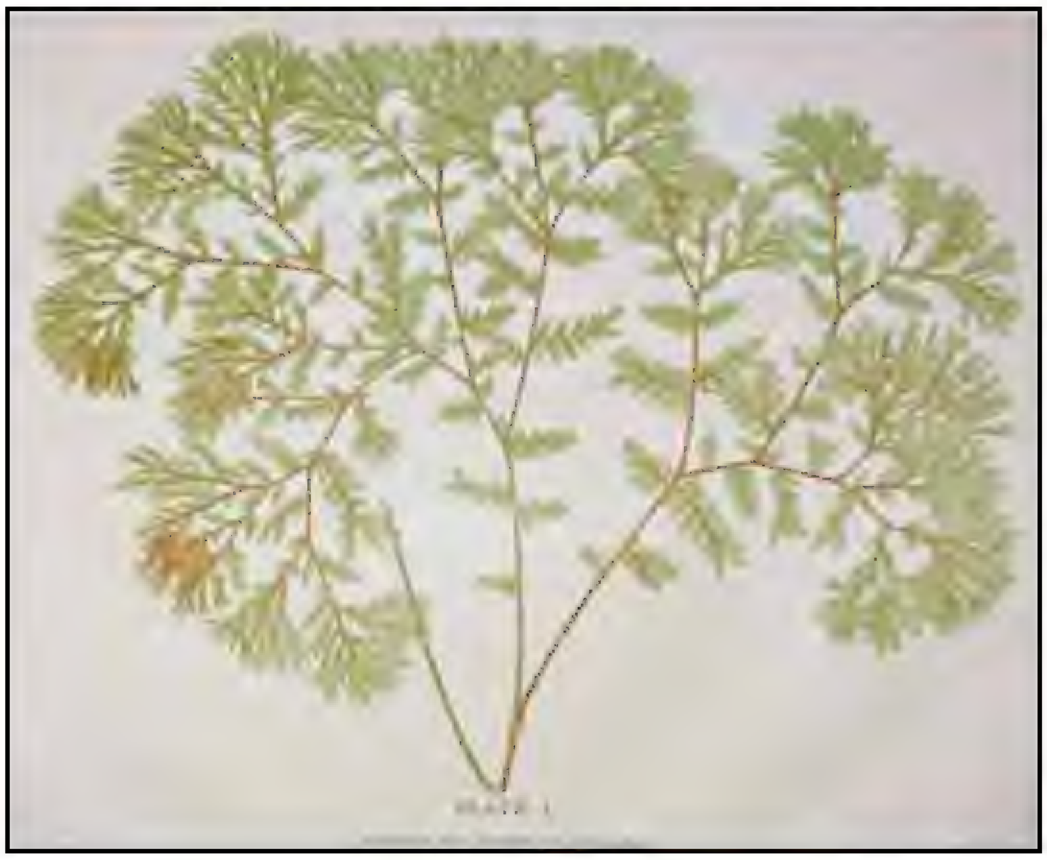

Fig. 1. *Athyrium filix-femina* 'Acrocladen'
Image from '*British Ferns and Their Varieties*' C.T. Druery (1909)

Up to autumn 2017 I had been saying 'Acrocladon' was a slow grower and if neglected it would probably not survive. Steve Coleman, an active cultivar hunter, was more hopeful and said that we will find it one day. Then we had a breakthrough. Alec Greening was talking to BPS member Chris Benson who runs a small fern nursery in Cumbria. Chris remembered that a horticultural representative, called Ian Unsworth, had commented on his ferns and told him that he had a collection of Athyrium cultivars. He had been a member of the BPS but found, at that time, that nobody was interested in cultivars, so he left the society. Chris passed on his business card to Alec who promptly rang up the firm, only to find that he had left.

A search of the Bulletin revealed his last known address and various attempts to contact him were made., but he never seemed to be in. Contact details were left in his letterbox and eventually Ian Unsworth made contact. I was staying in Cumbria at the time and Ian lived about 30 miles away. He was due to leave his house in an hour but said I was welcome to have a look at his ferns if I could be there very soon.

A quick trip down the M6 and there, in amongst some very choice varieties, was 'Acrocladon'. Ian let me take some old fronds but being autumn, so late in the year, he recommended we wait untill spring for some divisions. He was so delighted to meet like minded cultivar-orientated people he promptly rejoined the society after an absence of over 13 years and is currently writing a book on *Athyrium filix-femina* cultivars

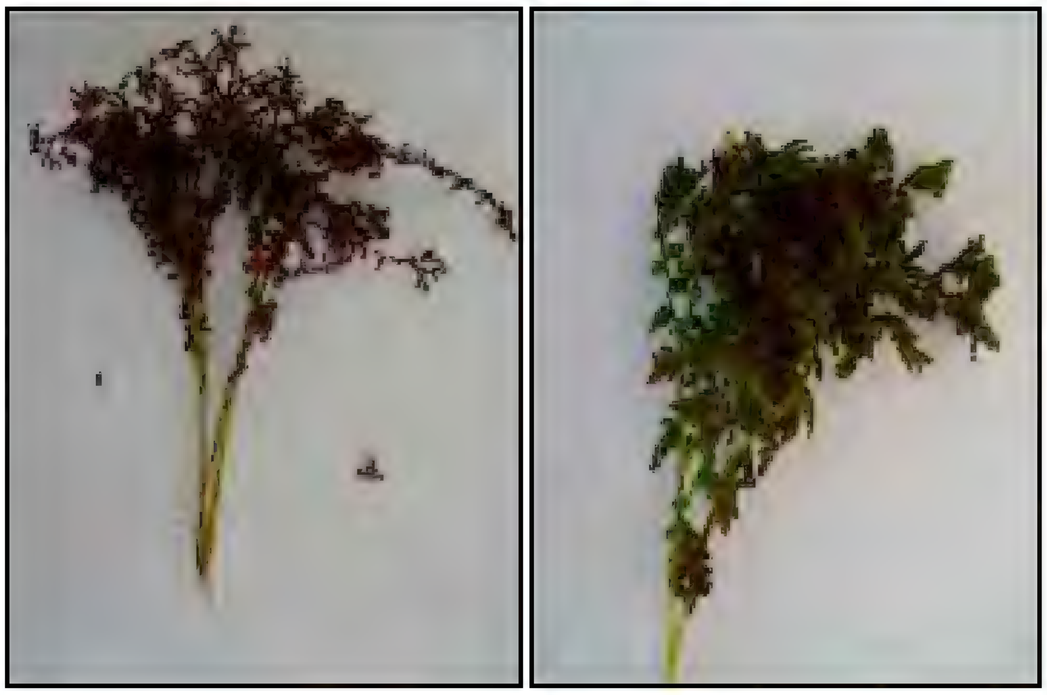

Fig. 2. Old fronds, collected in autumn, were ground up, cleaned, and sown.

Spores were extracted from the old fronds from autumn 2017 (Fig. 2) and from all the sporelings one is a contender. The others I suspect are contamination from all the other amazing lady fern varieties in his garden.

So, come May 2018, four members of the BPS who were keen cultivar hunters turned up at Ian's house together with the President elect. We brought plants for him to add to his collection and he let us have a couple of pieces of 'Acrocladon' and many other treasures Once it has settled down (Fig. 3) and produced new crowns, one will be sent to the national collection. Ian bought his '*Acrocladen*' from Reggie Kaye, and so this is the original clone that he was selling in the 60s at his nursery and could even be 150 years old.

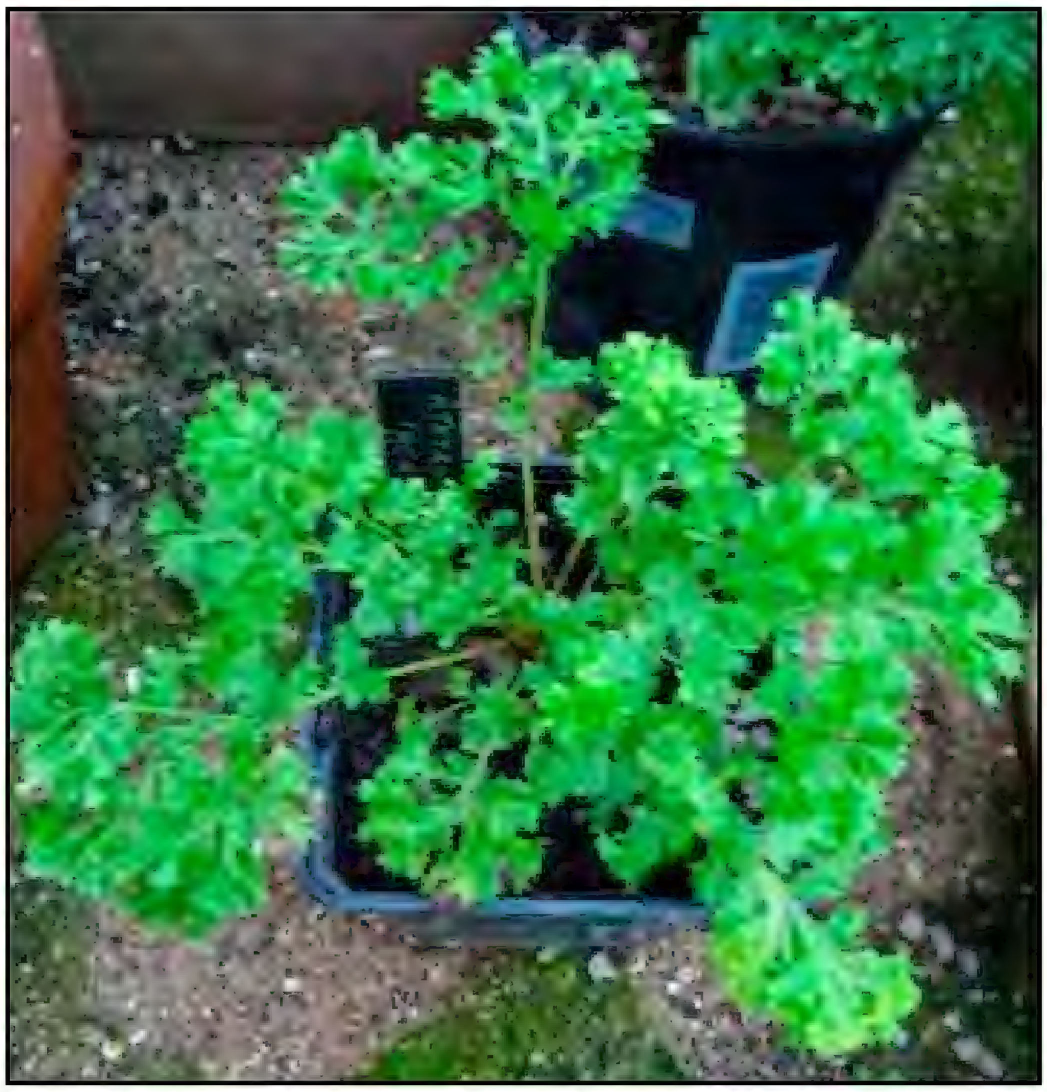

Fig. 3. Sporeling, September 2018, still very young and could still change to be branched and crested, who knows, but it is promising

Fern Lost and Found

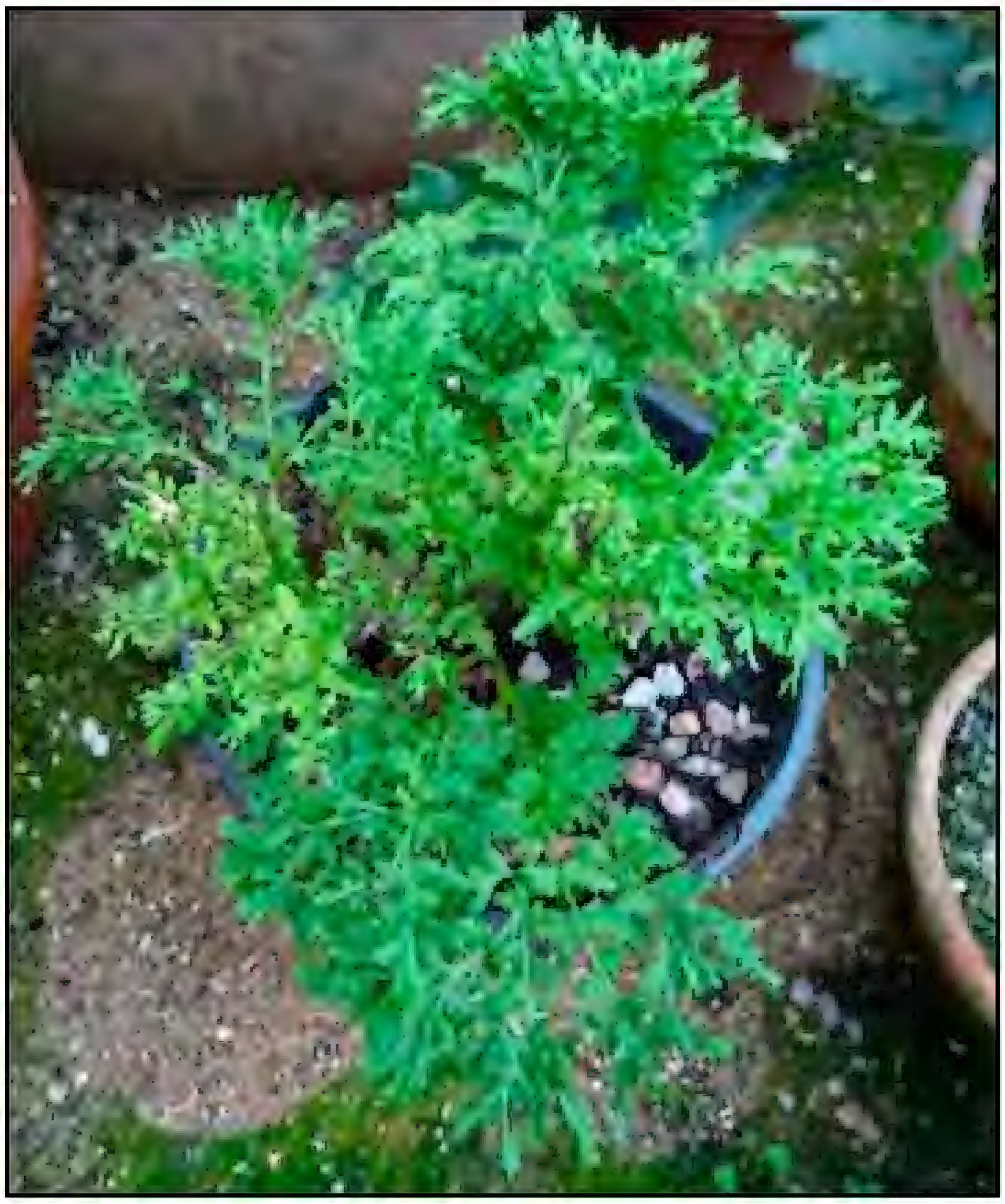

Fig. 4. Original plant from Ian in September 2018

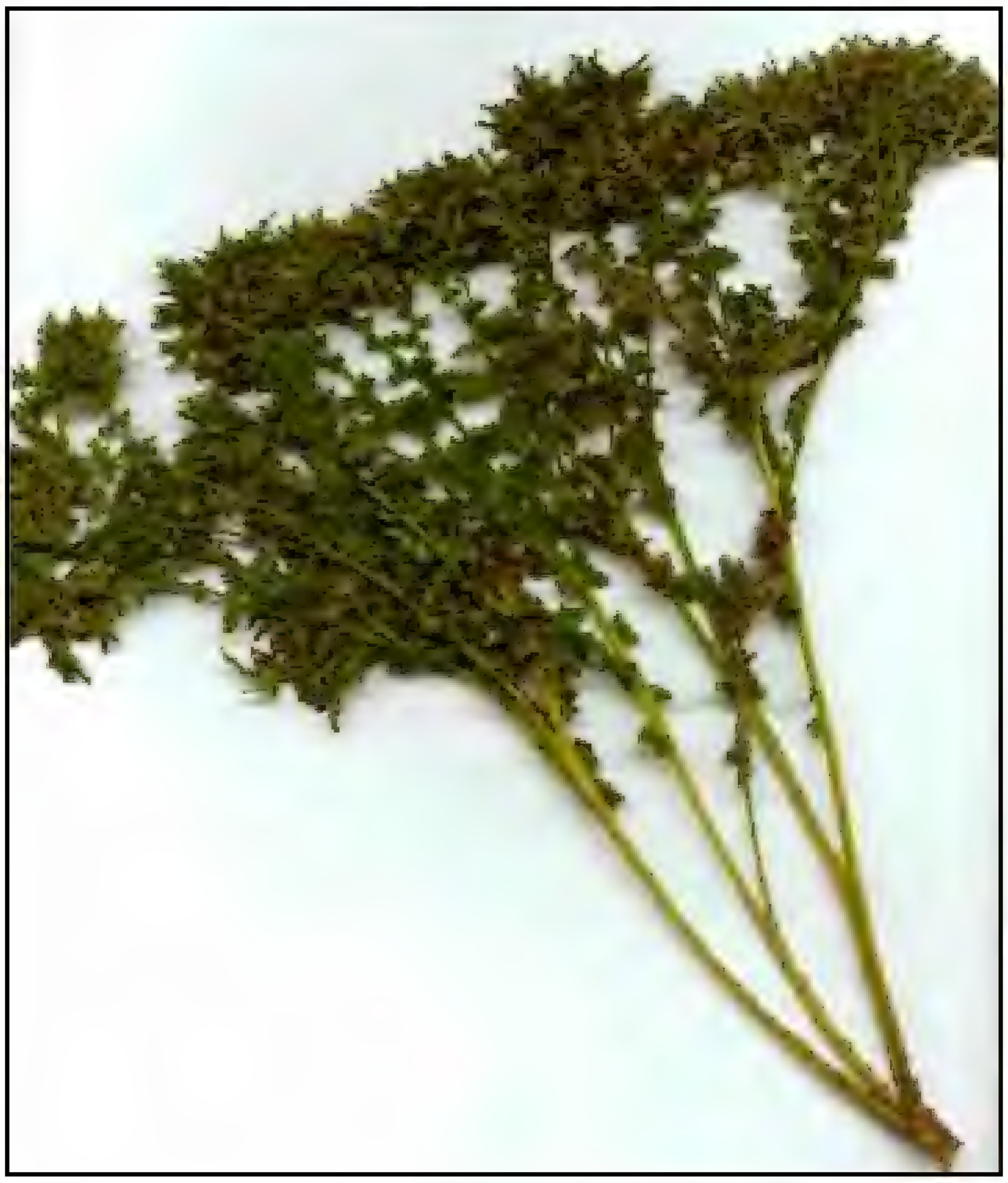

Fig. 5. Ian Unsworth's plant
Photo: I. Unsworth

This is what E..J.Lowe says about *Athyrium filix-femina* 'Acrocladon', in his book Our Native Ferns (1867)

> *This variety is worthy of the title of "Queen of Lady Ferns;" indeed its exquisite foliage is unequalled in the whole range of British botany, and, at the present time, it is at once the rarest and most remarkable of the British filices. Hitherto barren, plants have only been obtained by division, a slow process, which in eight years has not yielded as many plants. There is, therefore, no immediate likelihood that this much-coveted prize will become generally distributed. Indeed, so slowly has this charming Fern been increased, that the discoverer, Mr. C. Monkman, of Malton, has had to exercise seven years' patience before obtaining a specimen for his own collection. The original plant was found by Mr. Monkman growing by road-side on the moor-track between Byland and Rievaulx Abbeys, in Yorkshire. There were a few other Lady Ferns in company, all of which were quite normal; and, although various botanists have carefully searched the station many times, no second plant of Acrocladon has been met with, nor has even a slight divergence from the normal form of Athyrium been found. The discoverer presented his plant to Mr. A. Clapham, of Scarborough, in whose possession it has since remained. In 1863 that gentleman could boast of a plant (the original one) fully two feet high*, and as much in diameter,—a mass of the most exquisite foliage,*

(*This height is exceptional as normally it is only 12 inches (30cm). I suspect it was grown under glass like many of the fern growers did in those days.)

Since its discovery, many forms were grown and some are in the herbarium collection at Wisley, but Reginald Kaye, in 1965, was unaware of any Acrocladon variants being around, just the original. Charles Druery lists 2 forms 'Acrocladon*'* and a dwarf form 'Acrocladon densum*'*. Since this time other ferns like *A f-f* 'Plumosum Druery' have taken the crown of queen of the Athyriums in my book, but it is still a fascinating and charming variety. So to paraphrase Steve, "Another fern from the past saved for the future". I would like to thank those members who have been so generous in letting us look round their gardens and their generosity as well.

If you have any unusual ferns in your garden please send a picture in to the website or let us know by sending me a letter and we will endeavour to identify them. If you are looking for something and can't find it try The Plant Exchange or let us know on the website. In the past people did not share some of the rarities around as they wanted to be the only one to have it, so the plant dies out especially if disaster hit like being stolen or weeviled !

Remember the old gardener's phrase - if you give a plant away you never lose it!

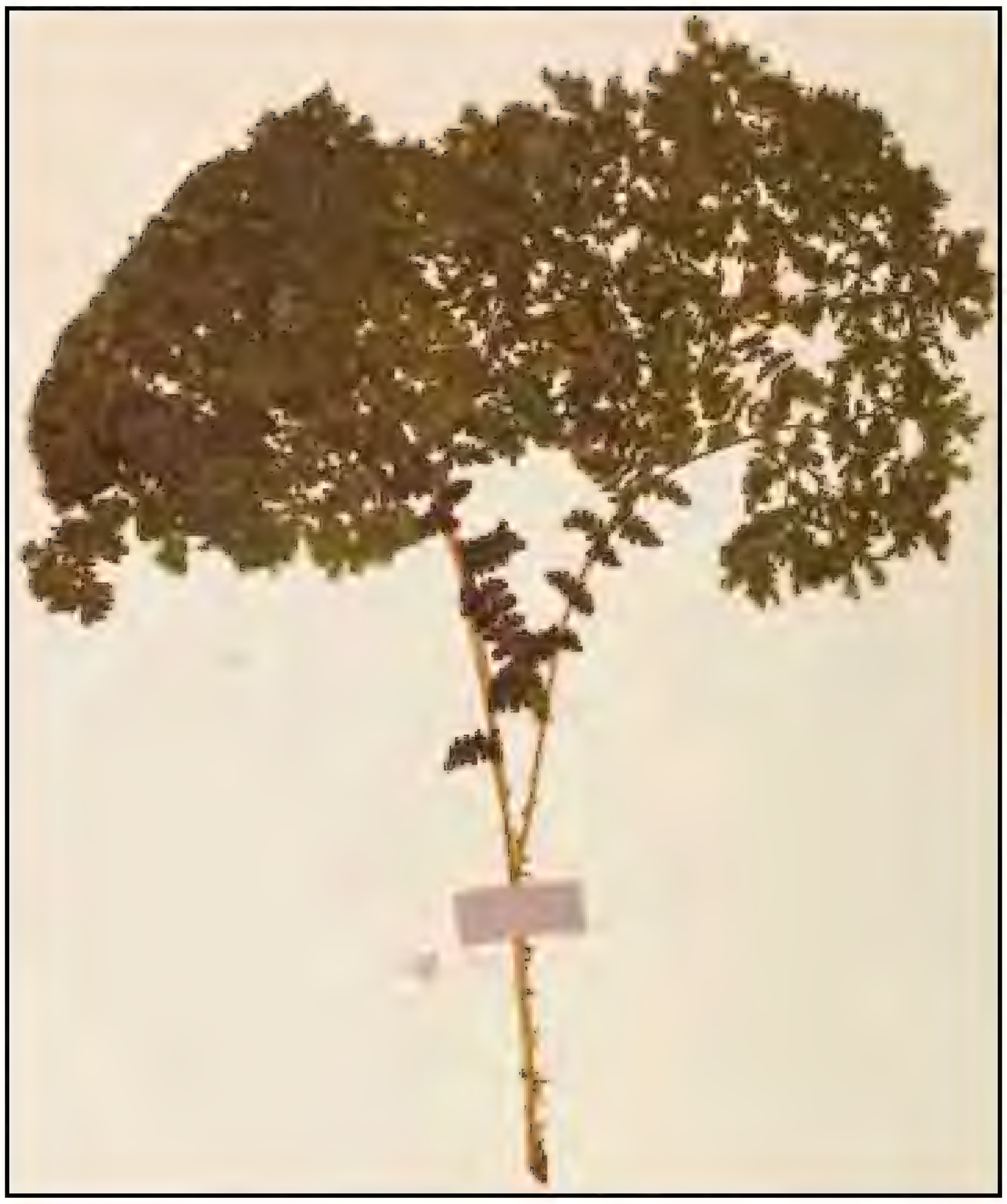

Fig. 6. 'Acrocladon'. With kind permission of the RHS Wisley herbarium from Druery's/Cranfield collection, picture taken before accessioning

Maintaining a Dryopteris collection

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While almost every fern enthusiast will at least have a couple of *Dryopteris* species and cultivars in his or her garden, only a few seem to actively collect them as such. Especially when it comes to cultivars people tend to be more interested in genera such as *Asplenium* or *Polystichum*. Although the commercially grown cultivars such as *Dryopteris affinis* ´Cristata´ and *Dryopteris filix-mas* 'Linearis Polydactyla´ are very common, some of the old Victorian cultivars are hard to find (at least for me). And if still grown, under what name are they grown today? Putting together a comprehensive, all-encompassing list of cultivars which still exist today, proves to be a huge task. Besides adding every existing cultivar to the garden, I intend to make an photographic overview of all cultivars which are still grown. The overview should include a short description, size and correct cultivar name.

In your search you sometimes discover new things and get new insights. For instance the name *Dryopteris affinis* `Grandiceps Askew` pops up from time to time. I have come to the conclusion that this cultivar does not exist! I have never seen a true grandiceps *Dryopteris affinis*. I have grown plants from spores under this name numerous times and they always turn out to be *D. affinis* 'Cristata' or *D. filix-mas* 'Grandiceps'. I have corresponded with Martin Rickard about this. "There was a large crested *Dryopteris* by the front wall of the Askew house which was referred to as `Grandiceps Askew' when I (M.R.) first went there, about 1970. From memory I think it was *D. filix-mas*, unfortunately I do not have a photo or material. Reg Kaye listed it as a very fine Borreri Grandiceps raised by Askew." But if anyone grows a real *D. affinis* 'Grandiceps' with large terminal crests I'd like to know!

Some cultivar name pops up now and then but I've never managed to find or see one in real life. I think *Dryopteris dilatata* 'Stansfieldii' is still grown but where? Does *Dryopteris filix-mas* 'Gracile' or *Dryopteris filix-mas* 'Jervisii' still exist today? Or do ramose *D. filix-mas* cultivars? And does anybody grow a stable clone of *Dryopteris filix-mas* 'Succisa'? Or has seen a crested *D. oreades*?

I have seen pictures of a crested *D. bissetiana* growing in Tsukuba botanical garden in Japan but doubt whether it has ever reached Western gardens.

And on occasion new cultivars (or at least new names) appear; Cultivars such as *Dryopteris dilatata* 'Wechloy', *Dryopteris affinis* 'Crispa Ministar', *D. affinis* 'Joyce Hayward', a dwarf 'Cristata Martindale*'* and others are all great additions to the collection. And what about *D.* x *complexa* 'Rumpelstilstkin' and *D filix-mas* 'Barnesii Cristatum'?

Some sowings result in plants you don´t have a name for. I have used old Victorian 'Latin' names for some of these cultivars. When truly new, this is not allowed based on the International Code for Nomenclature of Cultivated Plants from 1995. As a 'working title' I am allowing myself. I have grown a *Dryopteris filix-mas* 'Incisa Congesta Cristata' and a weird grandiceps form with very congested lateral pinnae which resemble molten plastic. If anyone has a name for this please let me know.

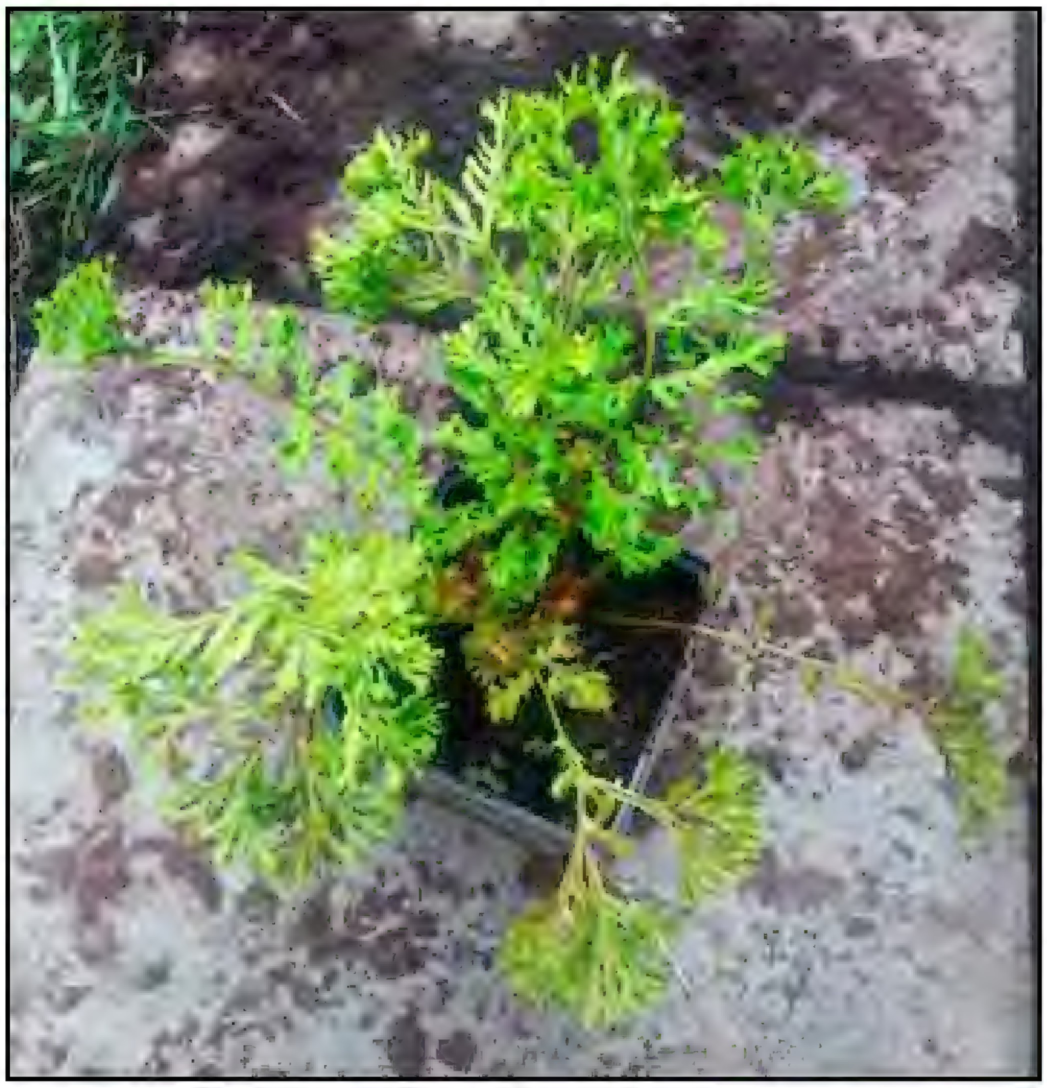

Fig. 1. Unknown grandiceps cultivar of *D. filix-mas*

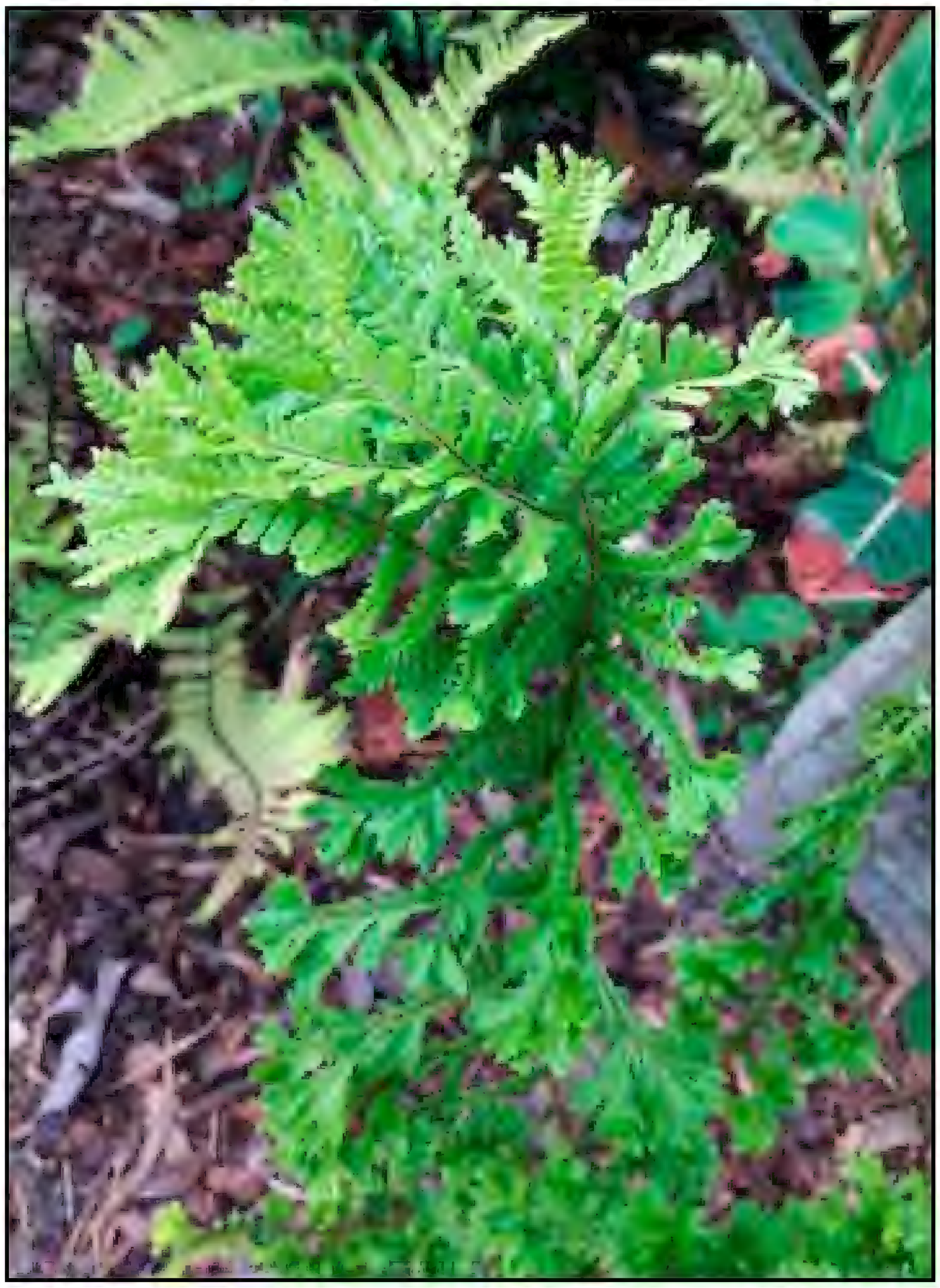

Fig. 2. *Dryopteris filix-mas* 'Grandiceps Wills'

Maintaining a Dryopteris collection

As far as collecting the species are concerned, there are no restrictions other than hardiness (and sadly… space!). I have tried (and lost!) more than a few species in winter. Species such as *Dryopteris oligodonta, D. sparsa* and *D. guanchica* are not hardy for me while *Dryopteris hawaiiensis* has survived for more than 3 consecutive winters without much protection. *Dryopteris fusco-atra* which is also a Hawaiian endemic struggled during a couple of mild winters and ultimately died.

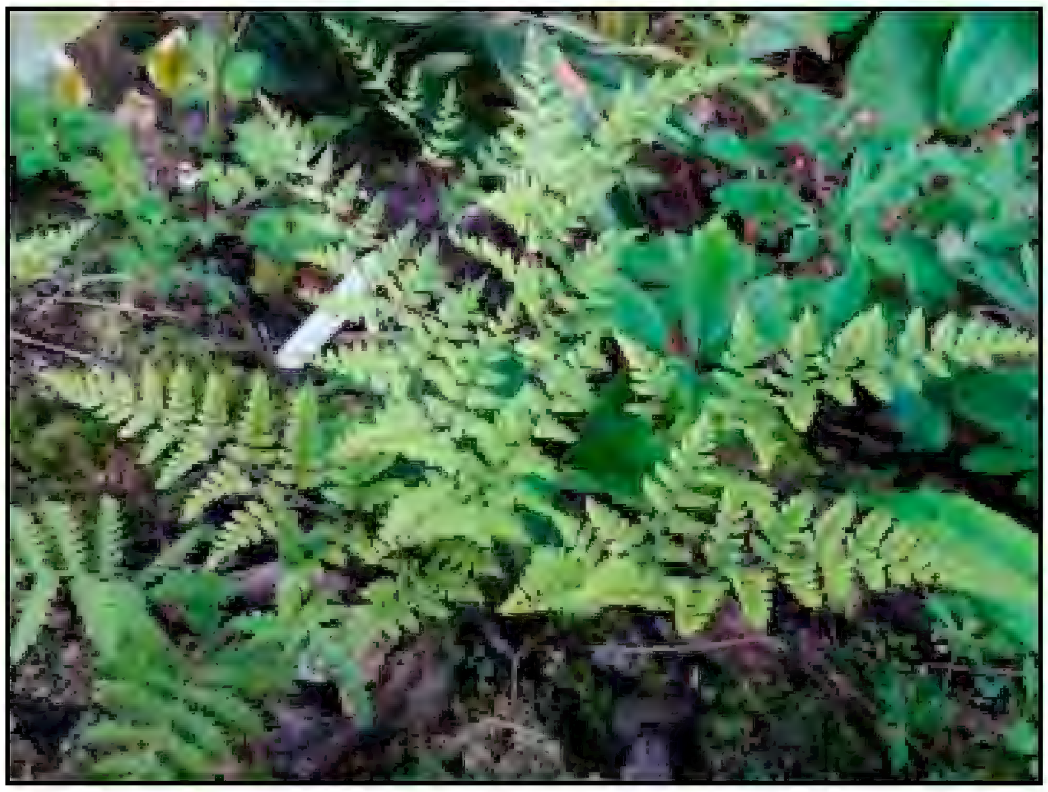

Fig. 3. *Dryopteris chinensis*.

Species which also struggle with the local conditions in my garden are *Dryopteris aemula* and *Dryopteris decipiens*. *Dryopteris koidzumiana* only seems to survive with adequate protection.

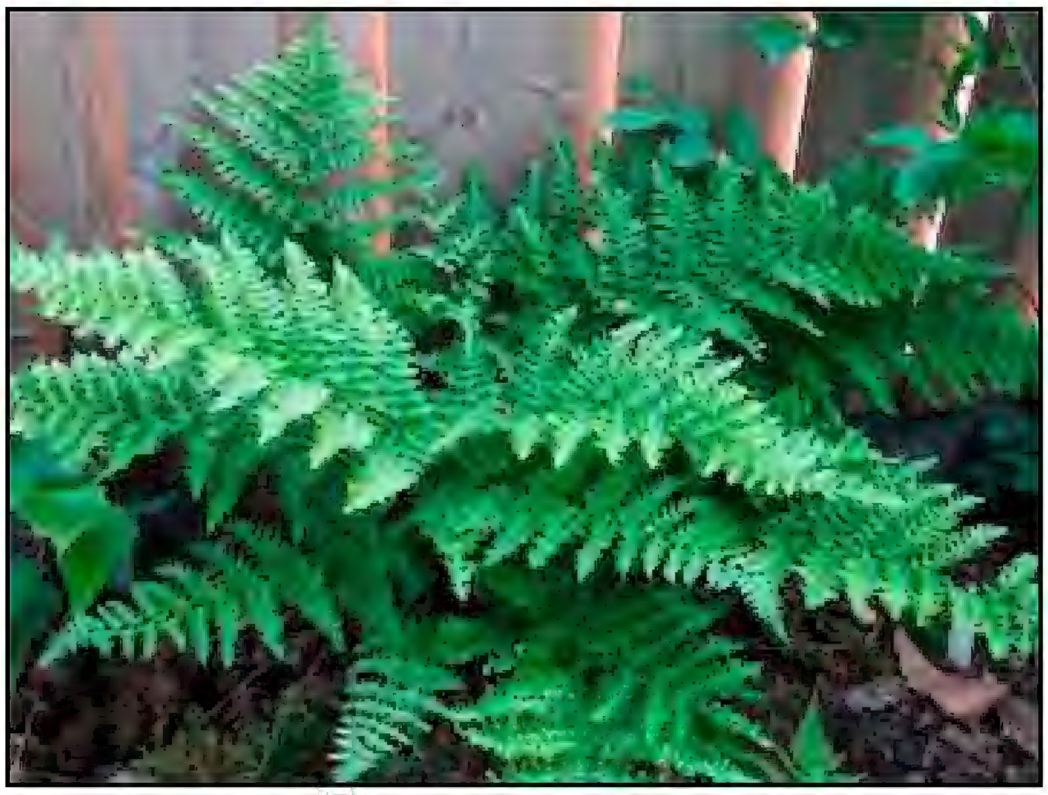

Fig. 4. *Dryopteris crispifolia*.

From time to time a new species appears on a spore list or someone finds something new on travels far abroad. The late Tim Pyner collected spores from a number of very interesting species such as *Dryopteris saxifragivaria* and *D. gymnosora* in Japan.

For me, the interest also lies in the often subtle differences between species. Species such as *Dryopteris pacifica, D. sacrosancta, D. bissetiana, D. saxifraga*, and *D. saxifragivaria* are very similar but I love to grow them all and see what differentiates them from one another. The genus is so vast that while some species do look similar there is a *Dryopteris* for any spot. Small growing species such as *Dryopteris fragrans* or *Dryopteris chinensis* (Fig. 3) or very big ones such as *Dryopteris* x *complexa*.

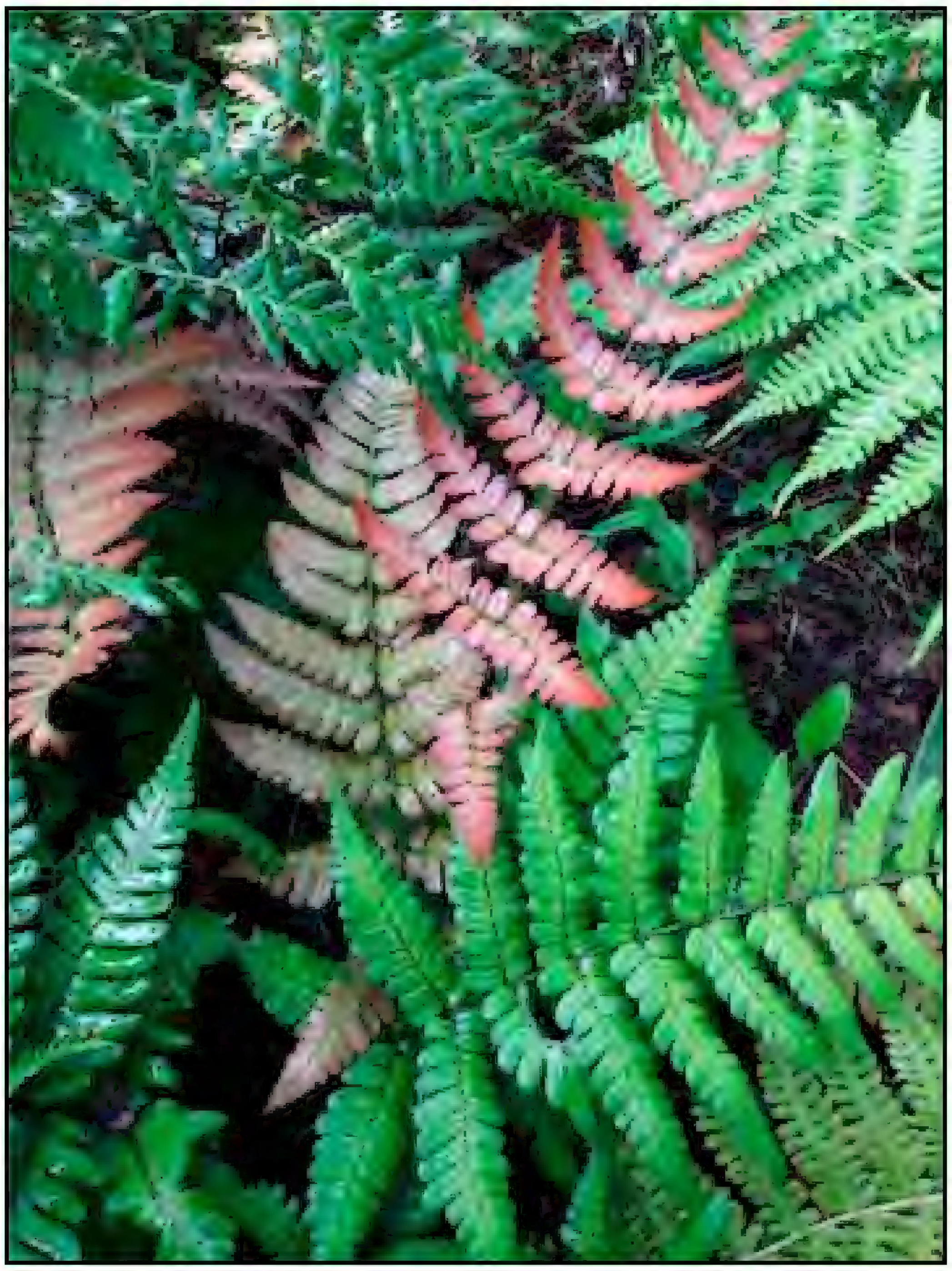

Fig. 5. *Dryopteris* sp. from Nanjing, China.

If anyone is growing lesser known cultivars from Victorian times I'd be very interested.

I have compiled a working list of cultivars I think are cultivated. Some may be synonyms. The ones in **bold** print I'd love to receive additional information about (where grown, spores, pictures etc.).

- Barnesii
- Barnesii crested
- Bollandiae
- **Clowesii**
- **Corymbifera**
- Crispa
- Crispa Cristata
- Crispata
- Crispata Hodgson
- Crispatissima
- Cristata Grandiceps
- Cristata Jackson
- Cristata Martindale
- Cristata Martindale dwarf
- Decomposita
- Depauperata Padley
- Depauperate form
- Euxinensis
- Fluctuosa Cristata
- Furcans
- **Gracile**
- Grandiceps
- Incisa Cristata
- Kleiner Klaus
- Linearis
- Linearis Congesta
- Linearis Nobilis
- Linearis Polydactyla
- Lloydii
- Lux Lunae Polydactyla
- Parsley
- Pumila
- Succisa
- Windermere Trippitt

The Resurrection of Henry Bradbury

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For much of the 20th Century, ferns were out of favour and memories of Henry Bradbury (1829–1860, Fig.1) and his fern 'Nature-Prints' were dead and buried. The revival of the popularity of ferns over the last 20 or 30 years, whether in the wild, in the garden, in the library or as a decorative motif, has resulted in the resurrection of interest in those remarkable prints, an interest that is expressed in a variety of ways, as will be described in this article.

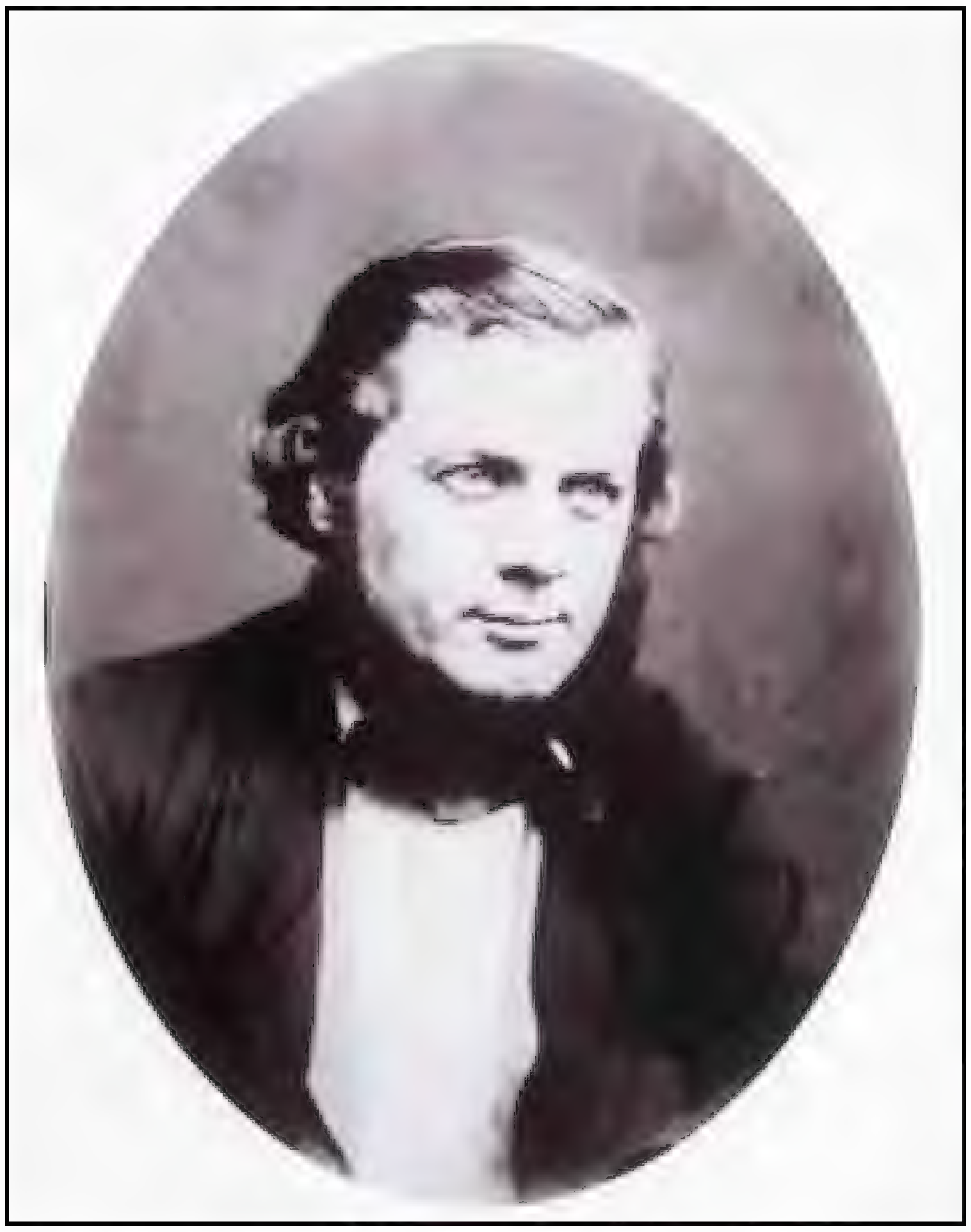

Fig. 1. Henry Bradbury; an albumen print by George Herbert Watkins. © National Portrait Gallery, London

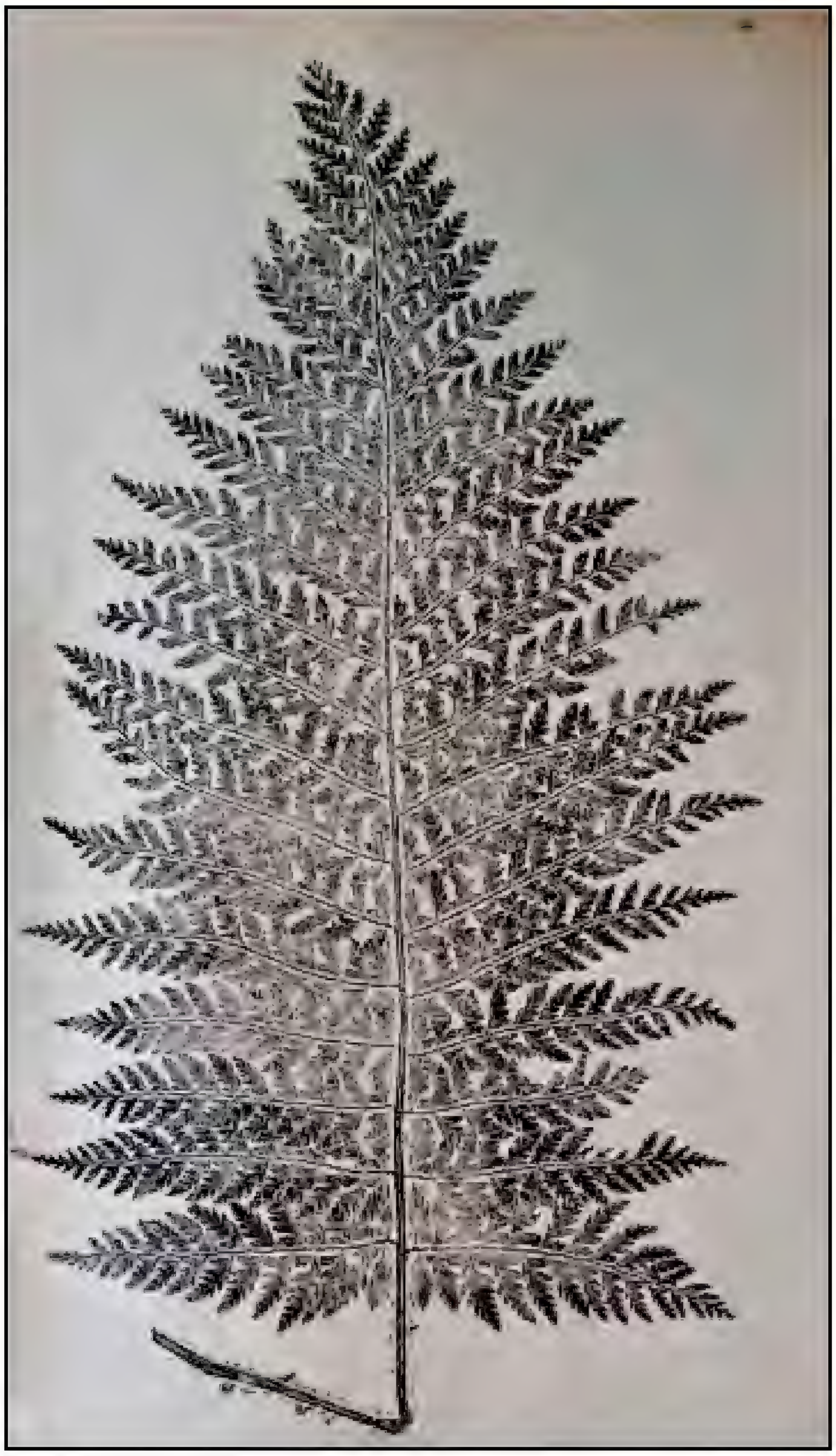

Fig. 2. Print #24 in Series 4 (1878) of 'Varieties of the British Species of Ferns' by Colonel A M Jones, from the Edinburgh set: "*Polystichum angulare latipes* Parsons" (now named *P. setiferum*).

The Bradbury Nature-Prints are widely regarded as the finest nature prints ever produced in Britain; Blunt called them the "crowning achievement of nature printing" and they are still unsurpassed. Nature prints are not drawn but taken from an actual specimen and thus can only be life-size. **Direct nature prints** ('Ectypa') are produced by printing from an inked specimen, re-inked for each print, in the manner of a finger print. The number of prints that can be taken from each specimen is very limited. The fern prints made in the late 1870s by Colonel Arthur M Jones (Hayward 2015) are impressive examples (Fig. 2). Of the 20 known sets of these prints, one can be seen at the Royal Botanic Garden Edinburgh, and two at Royal Botanic Gardens Kew. **Indirect nature prints** involve the creation of a printing plate with an impression of the specimen. The Nature-Printing technique used by Bradbury was pioneered in Vienna by Alois Auer. It involved taking an impression under pressure of a dried specimen on a polished lead plate and then making a copper electrotype copy to use as a printing plate. The first copper electrotype, with the image in relief, can be used for letterpress printing with the ink on the raised surfaces only. A second electrotype copper plate taken from the first produces an intaglio plate and the ink is retained within the recessed image and wiped from the rest of the plate surface, as with printing from a copper engraving. This allows for large numbers of copies from each original specimen. Bradbury used only the intaglio method for making prints of flowering plants, seaweeds, mosses and ferns. For each impression, the copper plate was hand-inked in up to three colours and then printed on soft paper to make a remarkably life-like embossed image. This process was carried out at the printing works of Bradbury & Evans, just off Fleet Street in London. Most of the published Nature-Prints were used to illustrate books on ferns and seaweeds, with text by leading authorities. Bradbury & Evans also printed the text and published the books. William Bradbury, Henry's father, had formed a partnership in 1830 with Frederick M Evans and by the late 1850s their firm was one of the largest printing and publishing houses in London, with more than 300 employees.

The Resurrection of Henry Bradbury

Before producing Nature-Prints to illustrate books, Bradbury printed a collection of loose folio prints, with a title page but no text, which was sold under a long title beginning: *A Few Leaves …….* (Bradbury, 1854). These were published by Bradbury & Evans as a set of 33 prints; another six, and a title page with a slightly different title, were added later (Dyer, 2004). Unlike later plates, all 39 plates showed a distinct plate mark smaller than the page; the marks were not all of the same size. The plates were offered for sale singly at 1s.6d. each or as sets of 21 for 1 guinea (equivalent to about £53 today) chosen from the full list; complete sets of 33 plates were initially deposited in a few libraries. Most of the 39 plates were of flowering plants but 5 were of ferns and demonstrated that the essentially 2-dimensional fern frond was pre-eminently suited to the process of Nature-Printing (Fig. 3).

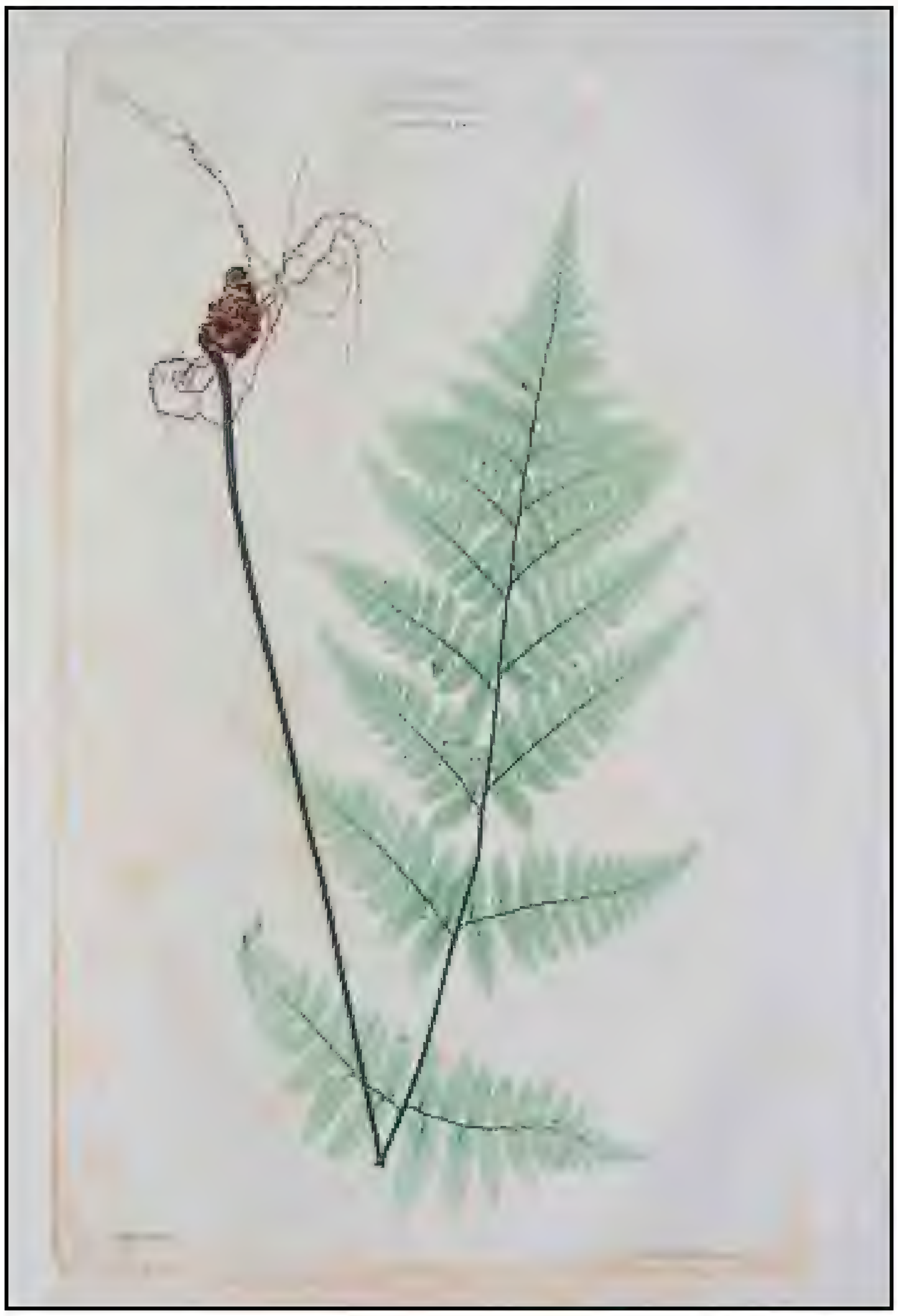

Fig. 3. Plate 15 on Bradbury’s list from folio Bradbury (1854): “*Lastrea spinosa* New., Withering’s Fern” (now named *Dryopteris carthusiana*)

It seems that very few sets were produced; only 20 have been traced, almost all in museums and libraries. The next publication with Bradbury Nature-Prints was devoted entirely to ferns and the plates were accompanied by a text: the folio *The Ferns of Great Britain and Ireland*, by Thomas Moore (Moore, 1855/56), was illustrated with 51 folio (ca. 375 x 555mm) Nature-Prints (Fig. 4). It was first issued in parts and then as a single volume costing 6 guineas (equivalent to over £300 today); it was re-issued in 1857. Bradbury Nature-Prints also illustrated the later 2-volume octavo *The Nature-Printed British Ferns*, also by Thomas Moore (Moore, 1859/60, re-issued 1863). In this there are 122 (royal) octavo (ca. 155x 240mm) Nature-

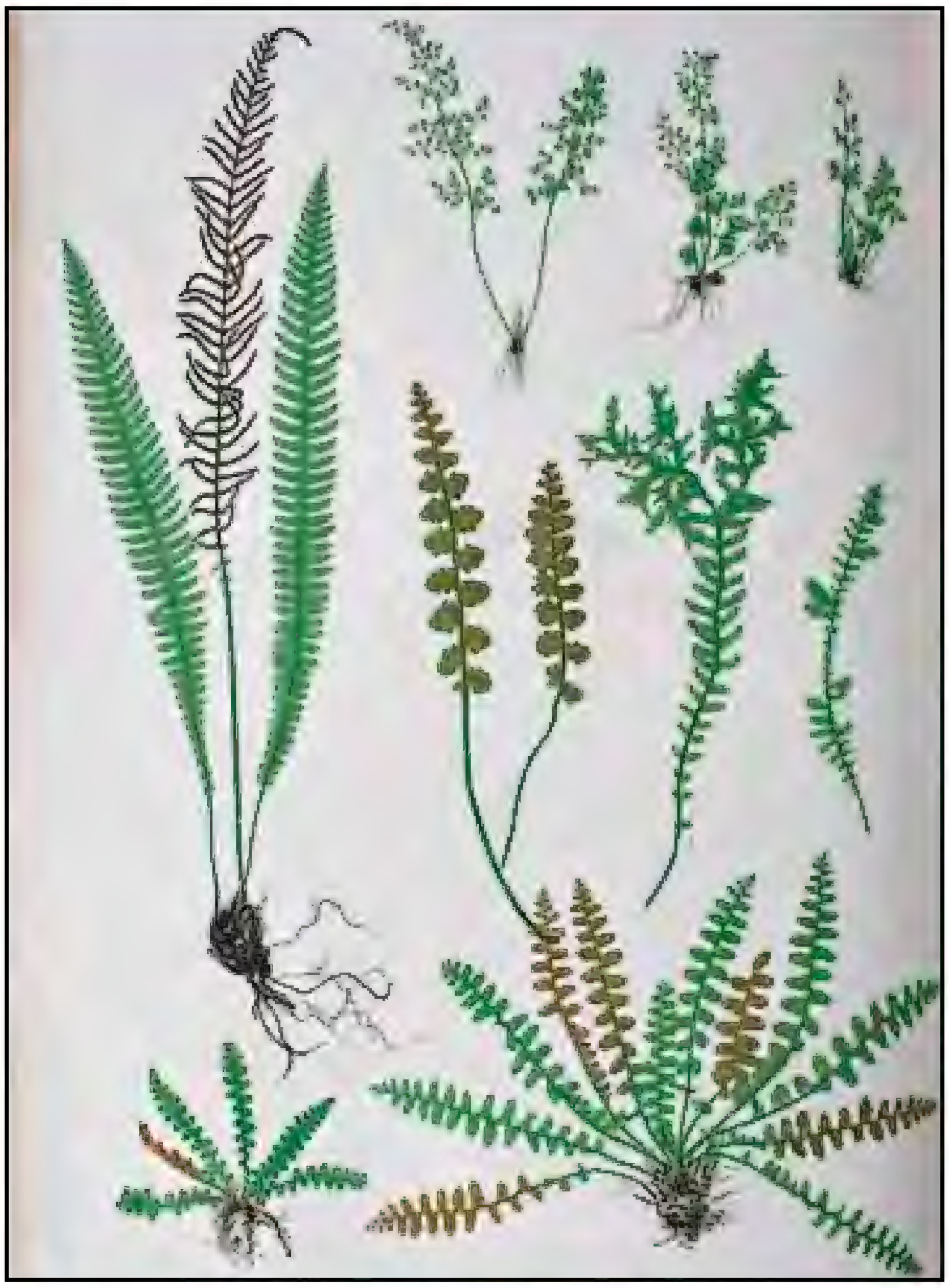

Fig. 4. Plate XLIII from folio Moore (1855/56): “*Ceterach officinarum*”, “*Gymnogramme leptophylla*” and “*Blechnum spicant*”

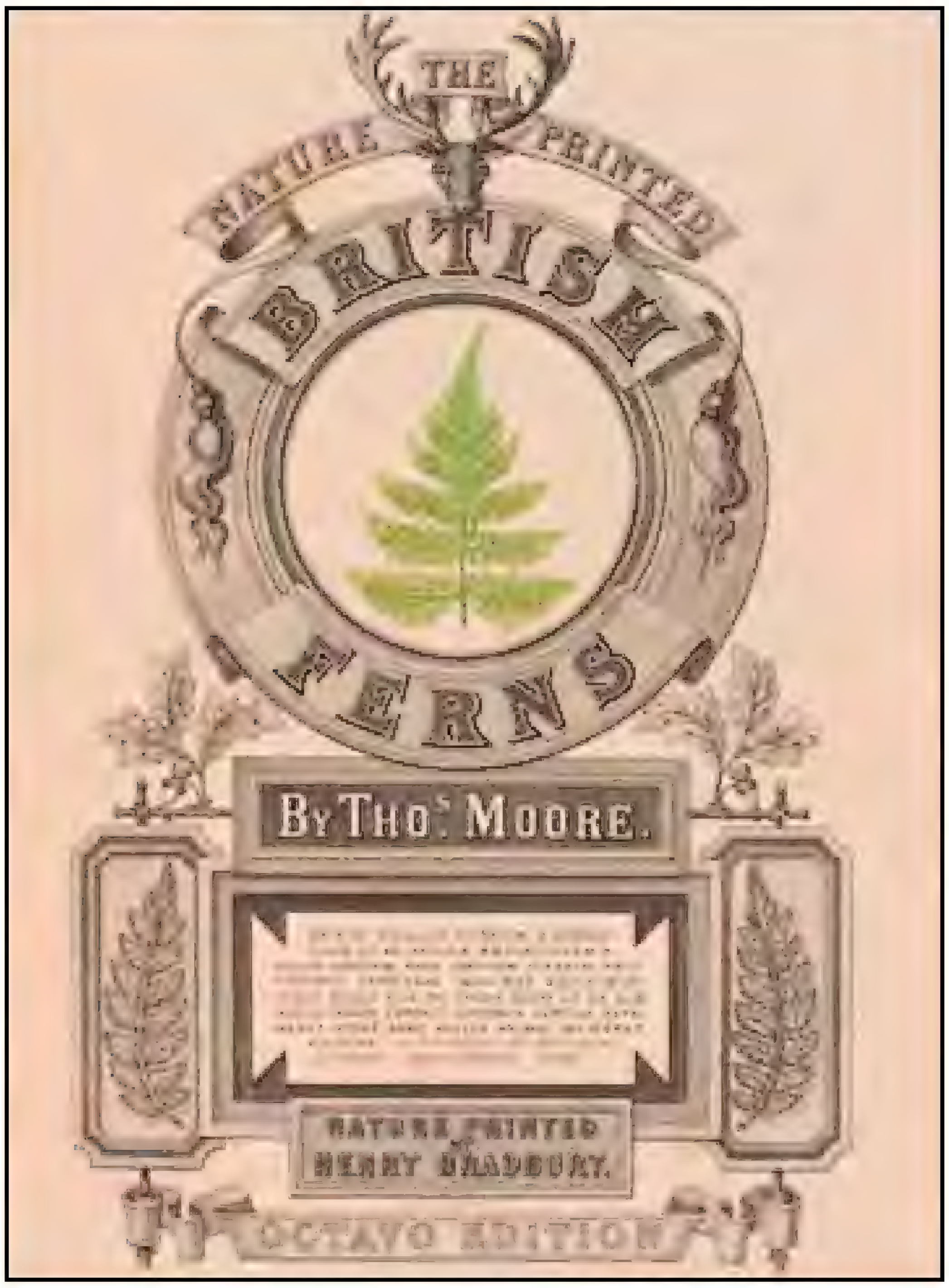

Fig. 5. Frontispiece from octavo Moore (1859/60), Volume I.

Prints as well as 2 title-page vignettes (Fig. 5); it was issued in two volumes costing 2 guineas each (equivalent to about £100 today), and re-issued in 1863 at the reduced price of £3.8s.0d for the set. Most figures in the books by Moore were composite plates with more than one frond, sometimes representing more than one taxon. A few prints of individual fronds in Moore (1855/56) were re-used in Moore (1859/60). Prints in Moore (1859/60) differed from those in Moore (1855/56) in having engravings of enlarged drawings of structural details beside the Nature-Prints. The octavo prints have the disadvantage that illustrated fronds of the larger species have to be atypically small or incomplete (Fig. 6). More details of Bradbury's life, work and premature death by suicide can be found in Dyer (2015). No new Nature-Prints were published by Bradbury & Evans after his death and although Auer in Vienna continued to produce books illustrated by this method until 1873, other publishers turned to cheaper colour printing methods and to photography.

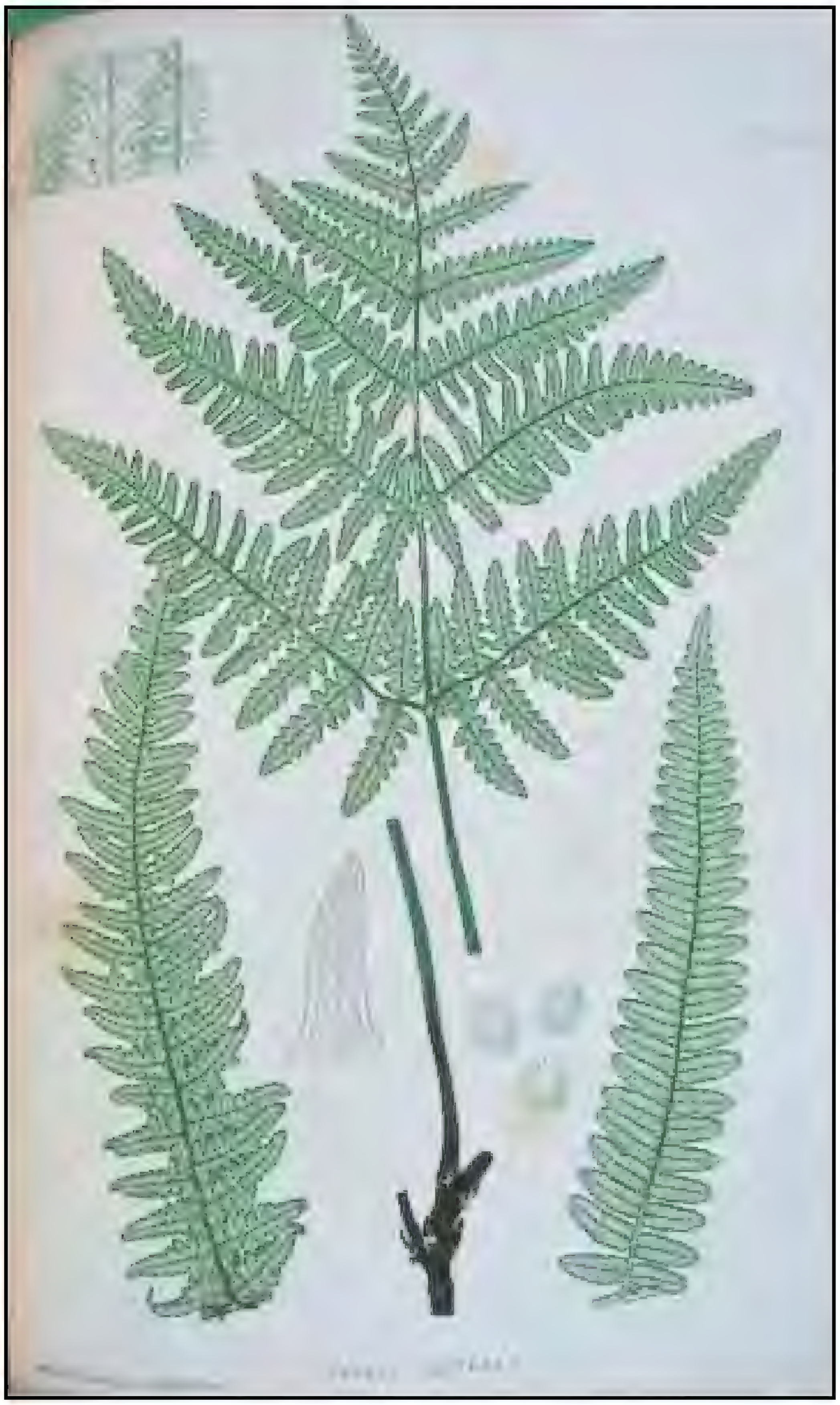

Fig. 6. Plate XCVIII from octavo Moore (1859/60): "*Pteridium aquilinum*"

A century after Bradbury's Nature-Prints were published, ferns had fallen out of favour and as a consequence so had books on ferns. Despite the quality of the prints, their monetary value had fallen significantly, even in the case of the more impressive and rarer folio volumes. My copy of Moore (1855/56) had been sold in 1909 for £1.11s.6d., the equivalent of about £90 today; in 1959 I paid £3.3s. (equivalent to about £50 today) for it. Since then has come a renewed interest in old illustrated fern books, especially those with Bradbury Nature-Prints, and their value has risen accordingly. The relatively few copies of folio Moore (1855/56 and, more rarely, 1857) that have come onto the market in the UK or USA in recent years fetched prices of £2000-£6,000 depending on condition. A copy donated by Bradbury to the Royal Institution was sold by Christie's in December, 2015, for £3,500. Another was offered on E-bay in 2017 for £4,750. The earlier print sets (Bradbury, 1854) appear for sale extremely rarely and when they do, they fetch even higher prices than Moore (1855/56); a set of 21 plates sold by Christie's in 2009 realized a price of £6,250. Even sets of the much more common and less impressive two volume octavo Moore (1859/60 and 1863) have fetched £300-£700. This puts owning one of these works beyond the reach of many fern enthusiasts. For someone wishing to view copies for research purposes, they can be examined in several major libraries or, if the physical contact is not essential, they can be seen on line. For someone wanting a printed version of these works, copies of the whole of Moore (1857) were published by Isha Books in 2013 and are available on a 'print-on-demand' basis very cheaply (less than £20), but they are reproduced in black-and-white, including the plates, and have been re-sized. Similar black-and-white-only 'print-on-demand' reproductions of Moore (1859/60) were published by Pranava Books in 2018 and are offered at about £30 for the two volumes. However, neither of these is likely to meet the needs of most Bradbury enthusiasts.

For someone wishing to possess a Bradbury print, or a reproduction of one, there are several options. For those wanting original Bradbury prints as wall art, it is possible to buy individual prints taken from dismantled books. Single folio plates from Moore (1855/56) are available on line at prices from about £160. A copy of Plate XLIII, of "*Ceterach officinarum*", "*Gymnogramme leptophylla*" and "*Blechnum spicant*", is currently being offered for sale for over £1,000 in the USA by Abe Books (Fig. 4). Single plates from Moore (1859/60) can be bought for about £40. Half plates from Bradbury (1854) were bound into Stannard (1860) but only 9 copies of this were produced; a copy can be seen at the Bodleian Library in Oxford. Bradbury plates from Moore (1859/60) and from the octavo *The Nature-Printed British Seaweeds: A History* (Johnstone & Croall, 1859/6) are inserted in books by Cave and Wakeman (1967) and Wakeman (1984) but these books are very rarely offered for sale.

Reproductions of Bradbury prints are available more cheaply. Some are more attractive than others but none has the embossed feel of original Nature-Prints that makes them so life-like. Colour plates reproduced from octavo Bradbury prints are available on line for some of the seaweeds in Johnstone and Croall (1859/60). They are reproduced in a range of sizes; the best prints, by the market leading Giclee process used by museums and galleries, sell at about £35 upwards according to size, while those reproduced by other processes are cheaper. Reproductions of ten Bradbury seaweed plates are also offered as ten different posters of various sizes on the 'Zazzle' website; each poster sized 813mm x 121mm is priced at £39.50. I have not seen advertisements for Giclee prints of plates from Bradbury (1854), Moore (1855/56) or Moore (1859/60) but Bradbury fern prints reproduced by cheaper methods can be found as wall art for less than £15. Then there are the four prints sold on line as "Fern Impressions I, II, III, and IV, © Old

World Prints Ltd. By Bradbury, 2008”. These are poster-size (557mm x 406mm) assemblages of prints of fronds taken from different plates in Moore (1855/56) (Fig. 7) and are priced at about £35 each. In compiling the posters, individual images of fronds have been enlarged or reduced and, in some cases, inverted. Colours have been changed, so that brown predominates on a dark cream background. Whether the results are considered attractive is a matter of personal taste, but they are only faint echoes of the Bradbury originals.

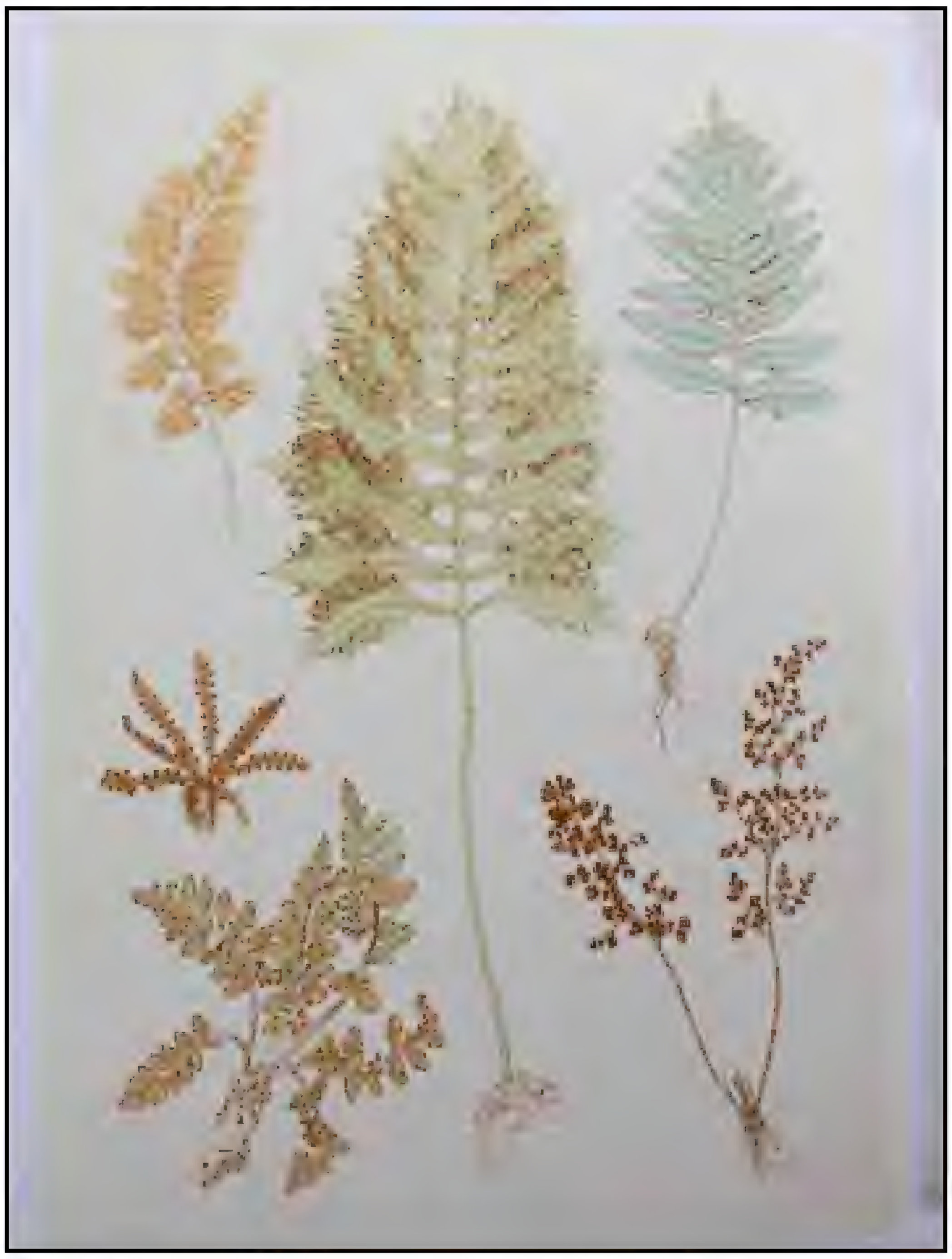

Fig.7. Fern Impressions II, © Old World Prints Ltd. By Bradbury, 2008

Images of ferns reproduced in a variety of ways, some of them nature-prints of actual specimens, have become increasingly popular as decorative motifs on pottery, fabrics, tiles, wallpaper, stationery, wrapping paper and even tattoos. In a few cases, reproductions of Bradbury Nature-Prints have been used in this way. James Merryweather has drawn my attention to cases for I-phone6 being advertised on line by Fine Art America (Fig.8). Fifty different cases priced at £17 are illustrated, each with a different detail from plates in Moore (1855/56). Another example of Bradbury prints as decoration, also provided to me by James Merryweather, is a paper napkin produced by Hallmark and obtained in North Carolina, USA, in about 1990; apparently a similar wallpaper was also produced. Selected fronds have been extracted from different original plates and the images reduced in size by differing amounts (Fig. 9). The images are not all exact copies. Some colours have been changed: the stipes and rachises of ‘*Asplenium lanceolatum*’ and ‘*Lastrea cristata uliginosa*’ have been changed from green to brown. There has also been some more subtle editing of some of the images. An overlapping lamina from another frond as it appears on the original print of ‘*L. cristata uliginosa*’ has been removed, and the stipes of the two different fronds of ‘*L. dilatata*’ have been shortened, re-positioned and made to appear as if lying under the lamina instead of on top of it as in the original. It is not clear why this technically-demanding modification of the images was considered necessary before they were used for the napkins. Nor could I identify the 3 butterflies or the source of their images.

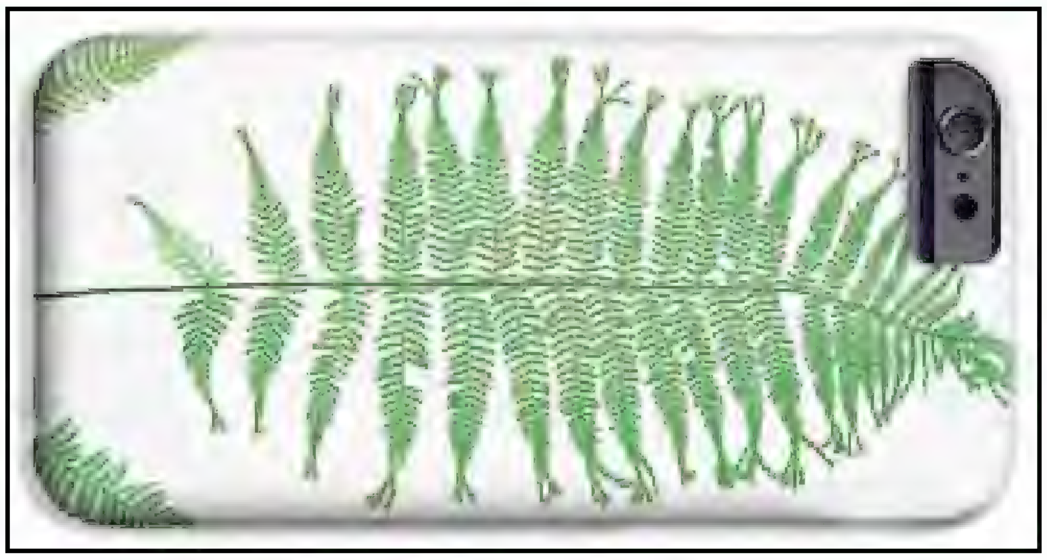

Fig. 8. I-phone 6 case advertised by Fine Art America

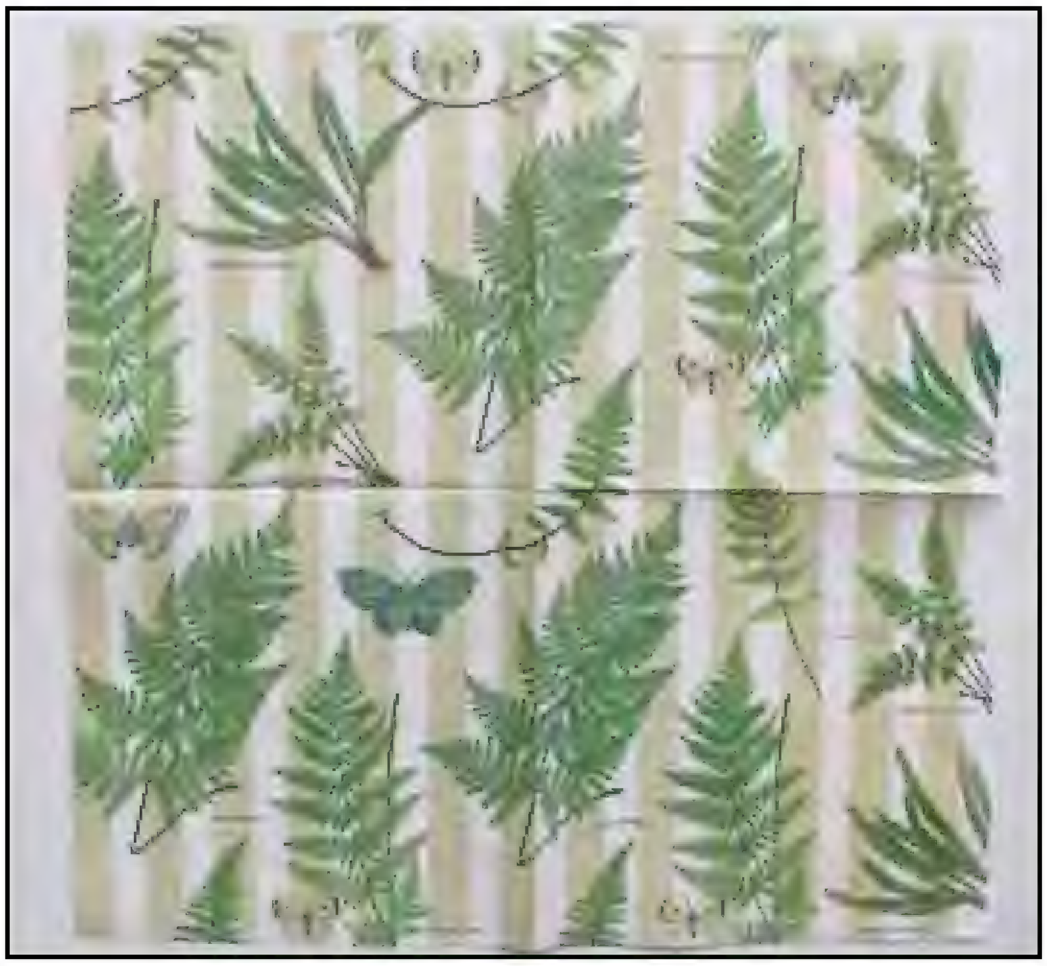

Fig. 9. Paper napkin, Hallmark ca. 1990

Another consequence of the resurrected interest in Bradbury’s Nature-Prints has been the attempts, despite the lack of critical detail in the published descriptions, to reconstruct the method he used. Trial and error at every stage has eventually achieved prints comparable to those of Bradbury. Peter Heilmann, a pharmacist in Germany internationally renowned for his library and his knowledge of nature printing, produced a limited edition of 750 prints of a leaf of *Acer circinatum* in 1989 (Fig. 10). More recently Pia Östlund, a graphic designer in London, has produced

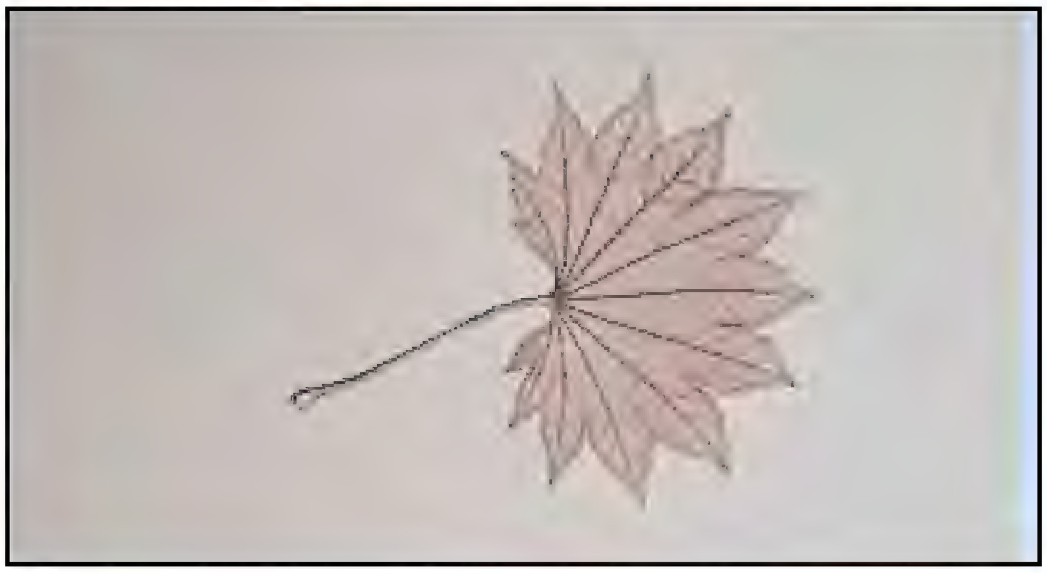

Fig. 10. Nature-Print made by Peter Heilmann of *Acer palmatum* leaf

a high quality print of a leaf of *Quercus robur* (Fig. 11) and is the only person since the 19th Century to have made Nature-Prints of fern fronds by the Auer/Bradbury method. A print of *Woodsia ilvensis* was prepared from a frond taken from a plant growing in my garden (Fig. 12). Copies of these original Östlund Nature-Prints are included in the 75 numbered copies of the limited (hardback) letterpress printed edition of a book, "*The Nature-Printer*" by Simon Prett and Pia Östlund (Prett & Östlund, 2016). This is an entertaining account, with colour illustrations, of nature printing in general and the history of the Auer/Bradbury method in particular, interwoven with a description of Pia Östlund's journey in attempting to re-create the complex printing process. Bound into the limited edition (but not in the paperback edition available from Chelsea Physic Garden) as an addendum is an Östlund Nature-Print of *Quercus robur* and on the title page is attached the Nature-Print of *Woodsia ilvensis* (Fig 13).

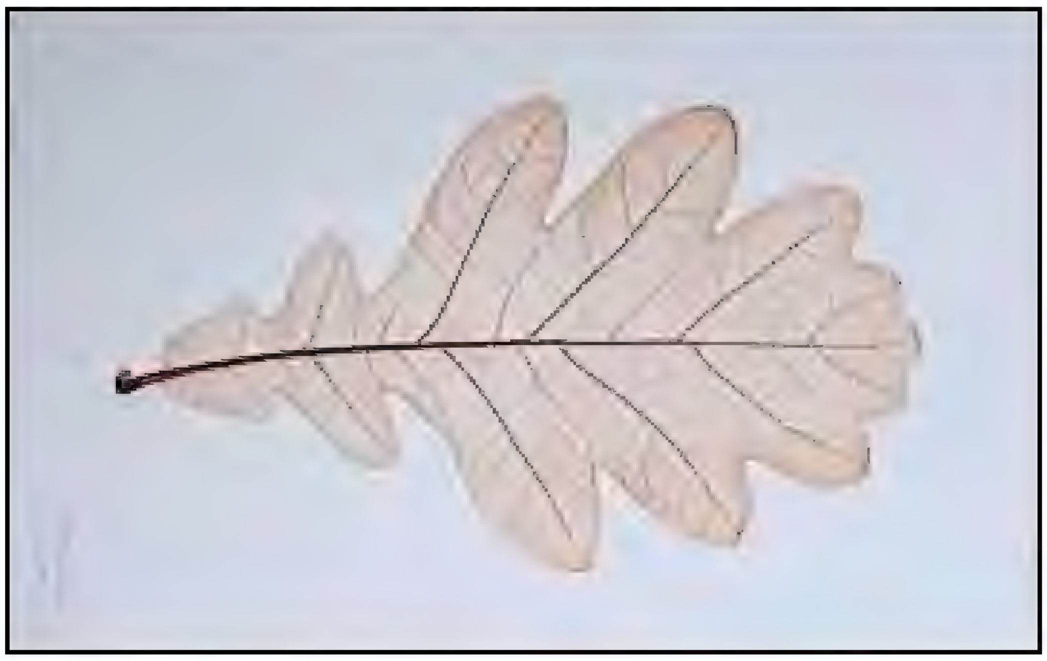

Fig. 11. Nature-Print made by Pia Östlund of a *Quercus robur* leaf

Addendum : See page 480 for more nature prints.

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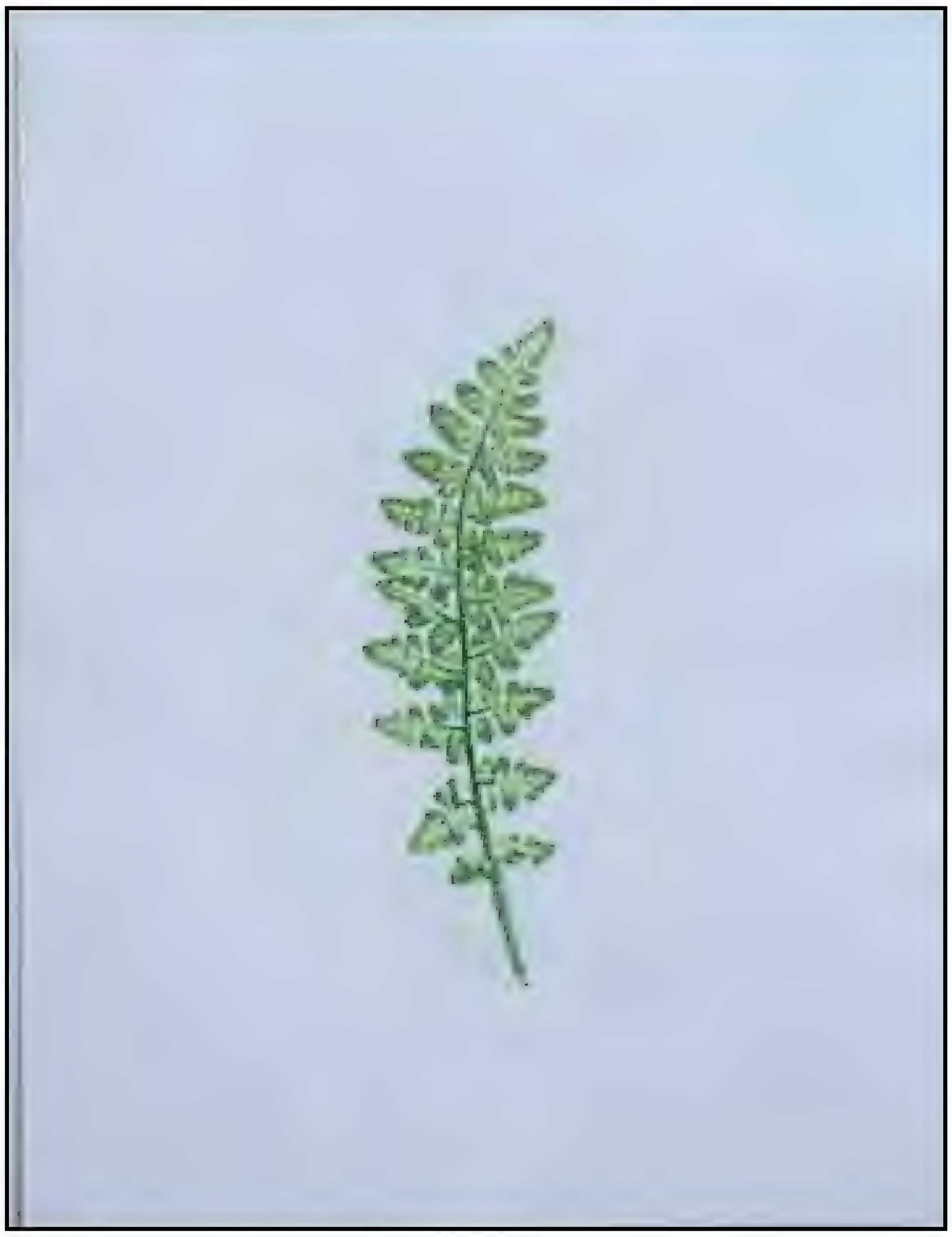
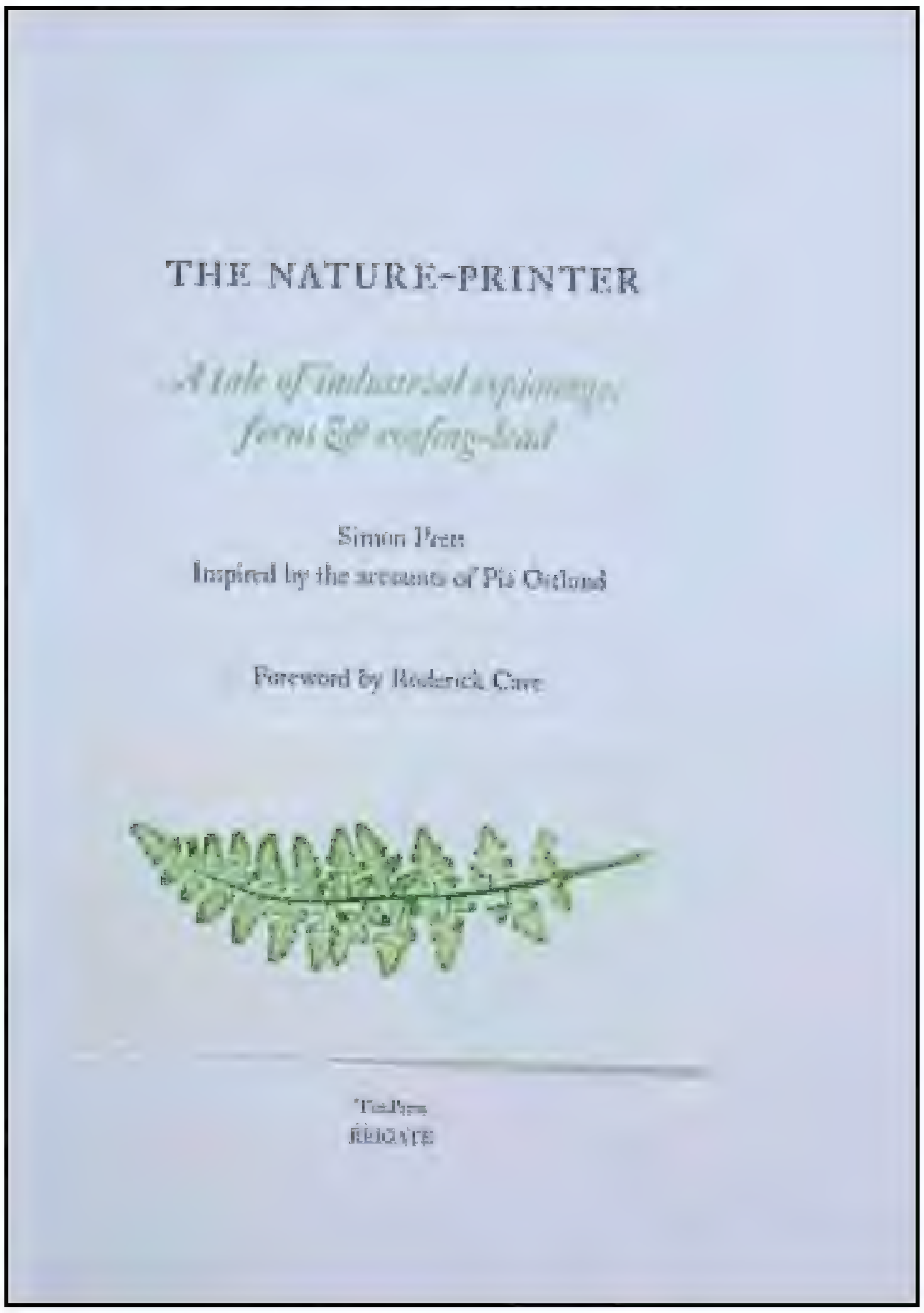


Fig.12. Nature-Print made by Pia Östlund of a *Woodsia ilvensis* frond from a plant grown in my garden



THE NATURE-PRINTER

A tale of industrial espionage,
ferns & roofing-lead

Simon Prett
Inspired by the accounts of Pia Östlund

Foreword by Roderick Cave

[illegible]
REIGATE

Fig. 13. Title page of *The Nature Printer*

Stewart Island – New Zealand Part 2
A Paradise for Walkers and Ferns

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Cambridge CB21 4TW
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Continued from page 427.

Rakiura track clockwise

Starting from the south eastern side of Oban, the Rakiura track proceeds clockwise along the Paterson Inlet, which cuts a large chunk out of the island. The path is close to the water, giving good views of the inlet, but every now and then crosses ridges slightly more inland. One is almost swamped with ferns along the path (Fig. 1).

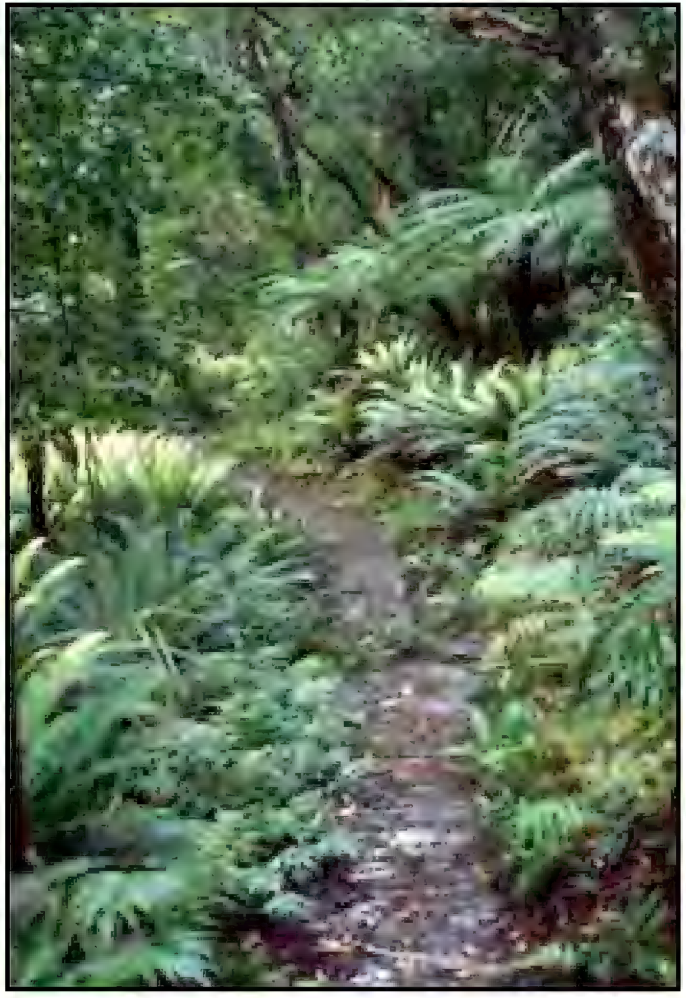

Fig. 1. Clockwise Rakiura ferny path on Paterson Inlet

Again, the track surface is variable from plain stony earth, to wooden board walks above swampy areas and - worst of all - peaty swampy stretches in which the brown liquid flooded my boots over and over again in 2000. Ugh! To some extent, I was compensated by the huge lawns of sporing *Phymatosorus diversifolius* (or *Microsorum pustulatum*) (Fig. 2) which, even in poor light, was shining at me with its extremely variable fronds from single undivided to those almost bipinnate (Fig. 3).

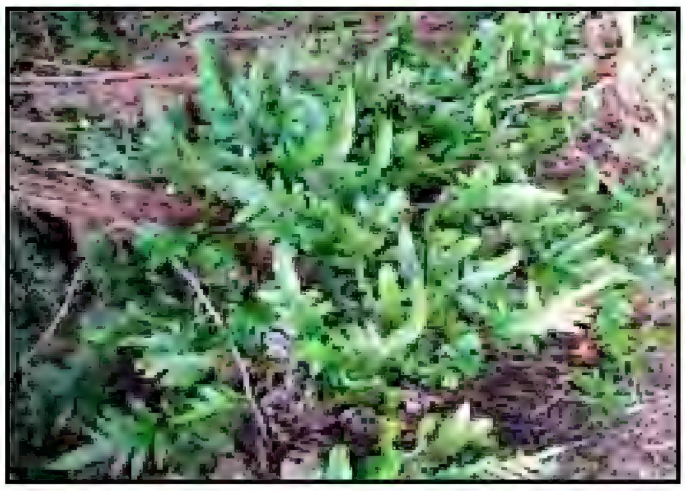

Fig. 2. Lawn of *Phymatosorus diversifolius* (or *Microsorum pustulatum*)

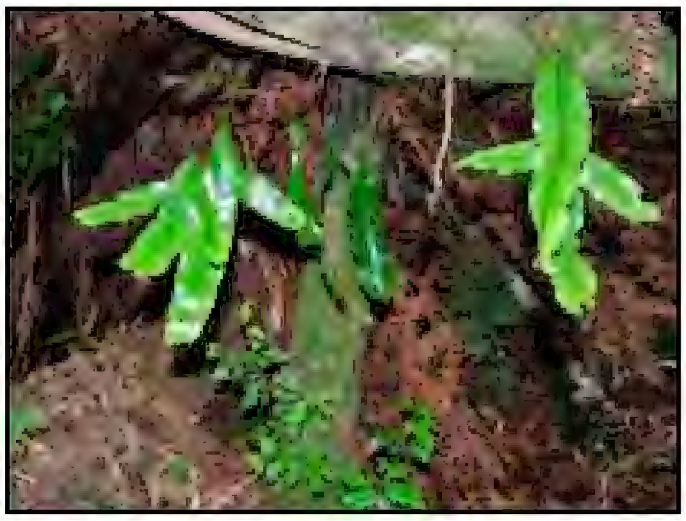

Fig. 3. Shiny fronds with black veining of *Phymatosorus diversifolius*

The obvious black vein patterns contribute to their great beauty. However it is so variable, it can appear to mimick *M. scandens*, which doesn't grow here (Figs. 4 & 5).

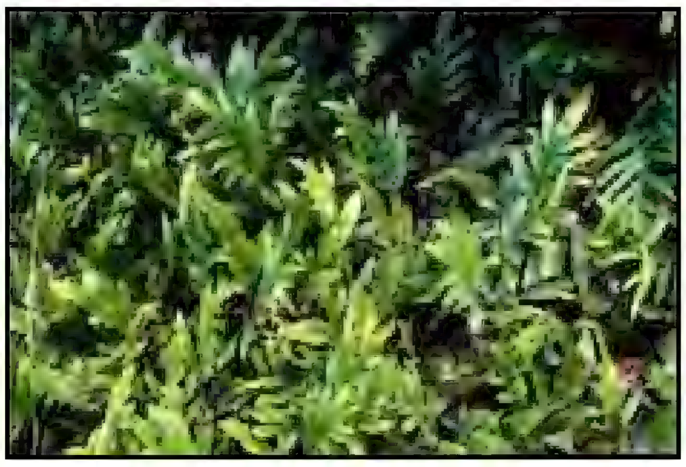

Fig. 4. *P.diversifolius* mimicking *P.scandens*

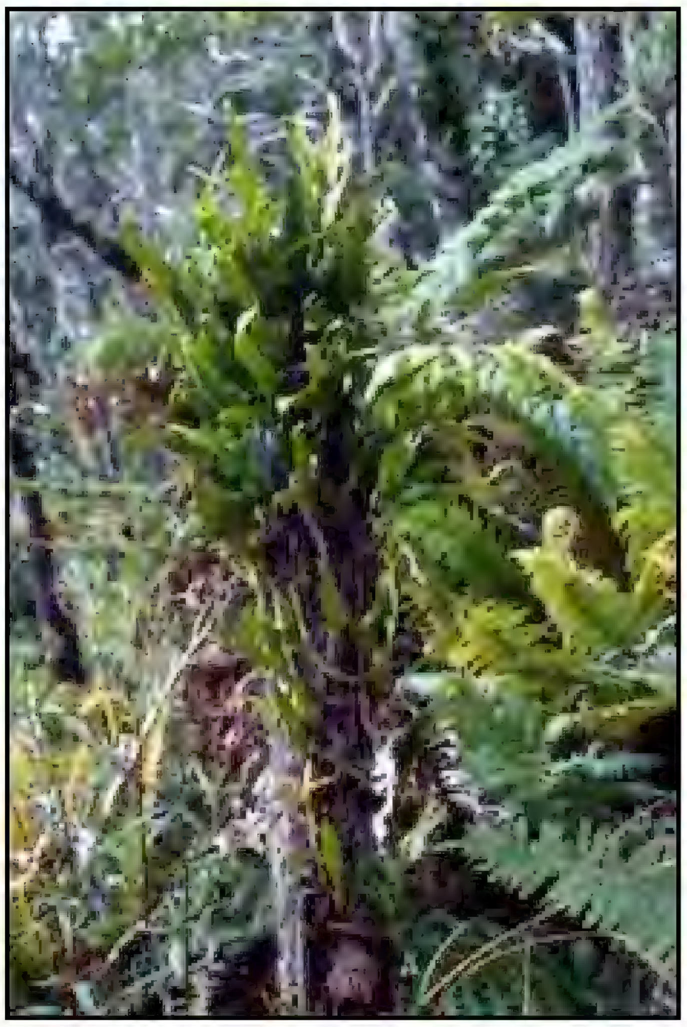

Fig. 5. *P.diversifolius* growing as an epiphyte

In retrospect, it was disappointing to see nothing on the clockwise track that I hadn't seen going anticlockwise. In compensation however, the much damper mushy soil produced those large lawns of single species such as *Blechnum minus* (see later) or *Blechnum procerum* (Fig. 6). Huge swathes of *Blechnum novae-zelandiae* or *Blechnum discolor* (Fig. 7) were gorgeous to behold. Most aspleniums were seen only occasionally, including good specimens of *A. bulbiferum* with pale green bulbils contrasting with the darker green fronds. There were plenty of baby tree ferns and certainly adult *C. smithii* (Fig. 8). Again I noticed quite a few plants of *Rumohra adiantiformis*, although never common like the blechnums. I have seen it on 3 continents, and always enjoy encountering its waxy

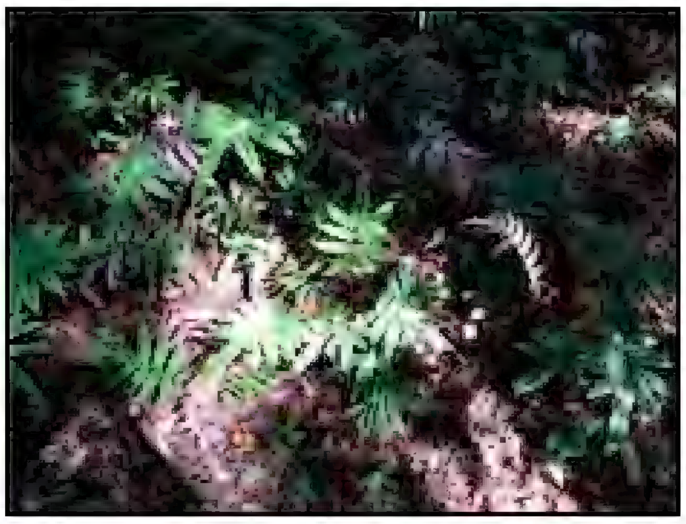

Fig. 6. Lawn of *Blechnum procerum*

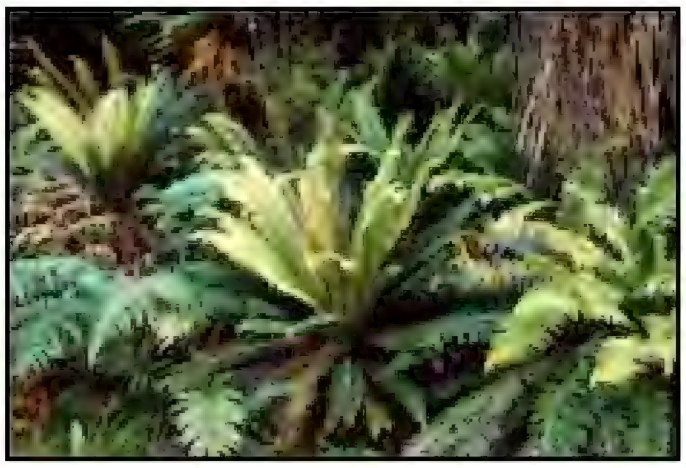

Fig. 7. Swathe of *Blechum discolor*

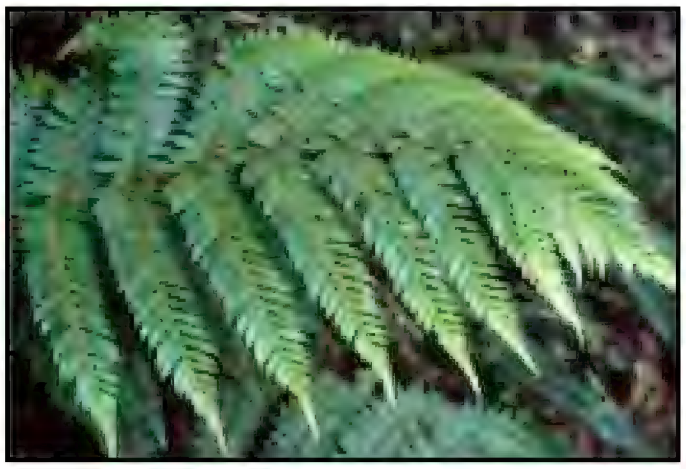

Fig. 8. *Cyathea smithii* frond

looking rigid fronds and even knowing it well, I always have to check that is has the characteristic black indusia on the frond backs (Fig 9).

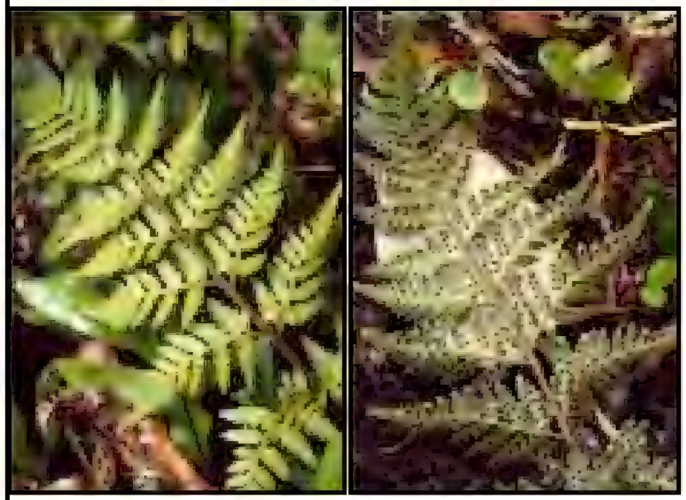

Fig. 9. *Rumohra adiantiformis*. Left, top and right, bottom of fronds

Once or twice I captured on camera a frond of *Leptopteris hymenophylloides* at the edge of a 35 mm slide but I never saw them in any quantity. I took only one slide of filmy fern here – *H. dilatatum* (see Fig. 27 in part one) and no longer remember whether I saw many filmies here or not. Another partial compensation for a repetitive fern flora was the very different views obtained when close to the water. The Paterson Inlet is full of small islands covered in vegetation and, despite the threatening mackerel-coloured skies, I had a view of the mountains (Fig 10)

Fig. 10. Paterson Inlet with Mt.Anglem in the background

The Rakiura track also forms the first part of the Northwest Circuit of 125km. It takes 10-12 days to complete and is frequently very muddy indeed. It passes around Mount Anglem, to which there is a side track. Had I been able to manage both the Northwest Circuit track (described as 'challenging') and a small deviation up Mount Anglem, I would have been able to see my favourite polystichum - *P. cystostegia*) but I know my limitations and stick to short walks. There is also a Southwest track of 6-9 days (105km)

.

Island of Ulva

Within Paterson Inlet is a small island, a few square kilometres in area, called Ulva (269 hectares). Several people take hikers across from Golden Bay in their small motor boats - a 10 minute ride. My boatman both years was Peter, who supplied marked mutton bush leaves as tickets for the return journey to discourage the many visitors who try and board whichever small boat docks first without any discrimination. In 2015, Peter told us to listen carefully for all the bird noises because he was so proud of the fact that the greedy egg-eating rats had been eliminated, thus allowing the birds to flourish again in what is now a bird sanctuary.

Once on Ulva there are two main walks, one to Boulder Beach and West End Beach on the opposite side from the landing place, another to a south easterly bay and several smaller walks. The round trip is a few kilometres on well-made paths with some ups and downs. It goes through thickly-wooded vegetation in which it is impossible not to be surrounded by ferns contributing to an intense greenness of so many different shades. In 2000, with a pre-digital camera and several lenses to juggle, I took no photos on the first part of the walk because of the heavy incessant rain. In a brief break in the rain, next to Boulder Beach I was delighted to find *Asplenium obtusatum* again, and a few plants of *Blechnum blechnoides* (see later). Rain returned for the rest of the hike consequently I have few photographs to remind me of the ferns there. My overall impression was strong enough for me to return twice in 2015. On the first occasion it was hot and sunny on the way to West End beach - a rare event here - but on the second walk to Boulder Beach, rain was pouring down again. Perversely, my digital photographs were more successful in rain than sun because, even in the thick wood, vivid shafts of sunlight on the ferns caused either bleaching in the images, or they were too dark in the shadier parts.

Thinking back, my overall impression fern-wise was great swathes of blechnums (Fig. 11) on the ground and less commonly many aspleniums either on the ground or on trees and fallen tree trunks. These aspleniums were rather a puzzle.

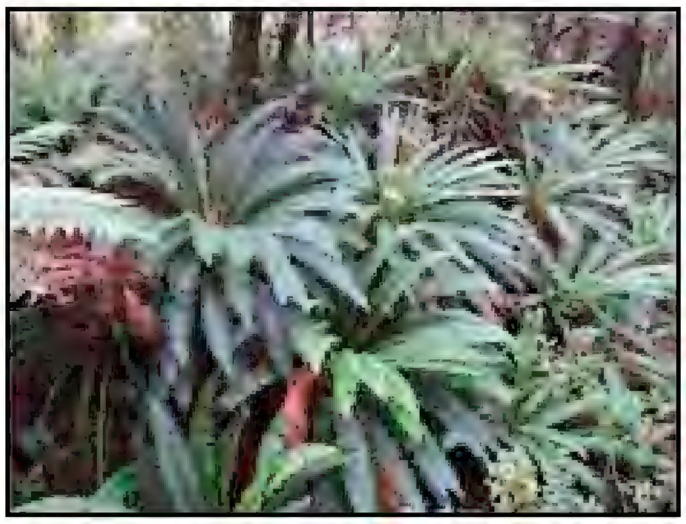

Fig. 11. *Blechnum discolor* ground cover on Ulva

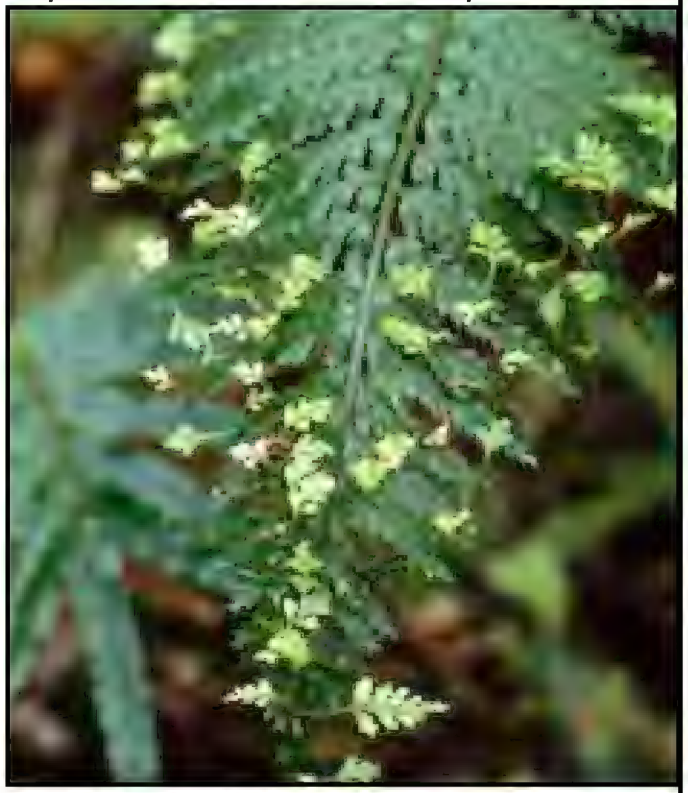

Fig. 12. Frond of *Asplenium bulbiferum* with bulbils

It is easy to define a moderate sized plant with well divided fronds and bulbils as *A.bulbiferum* (Fig. 12), or a pinnate one with blindingly shiny, toothed, almost elliptical, narrow, drawn out pinnae as *A. polyodon* (Fig 13).

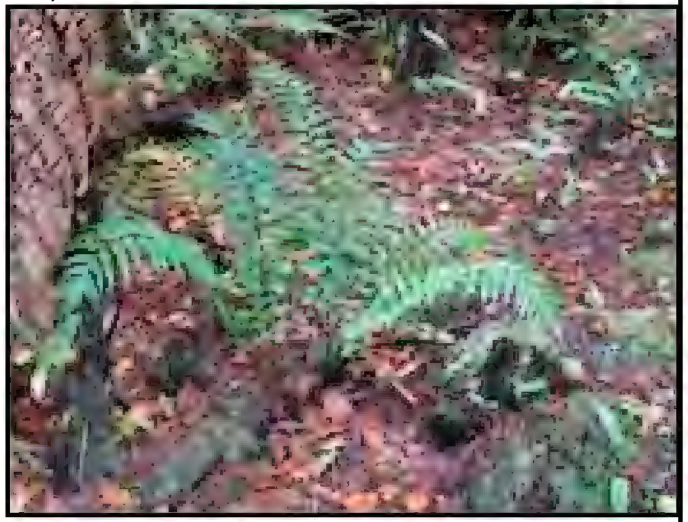

Fig. 13. *Asplenium polyodon* clump

A. scleroprium, with long, thin, linear, regularly- and deeply-toothed pinnae seems to be pretty constant in form (Fig. 14).

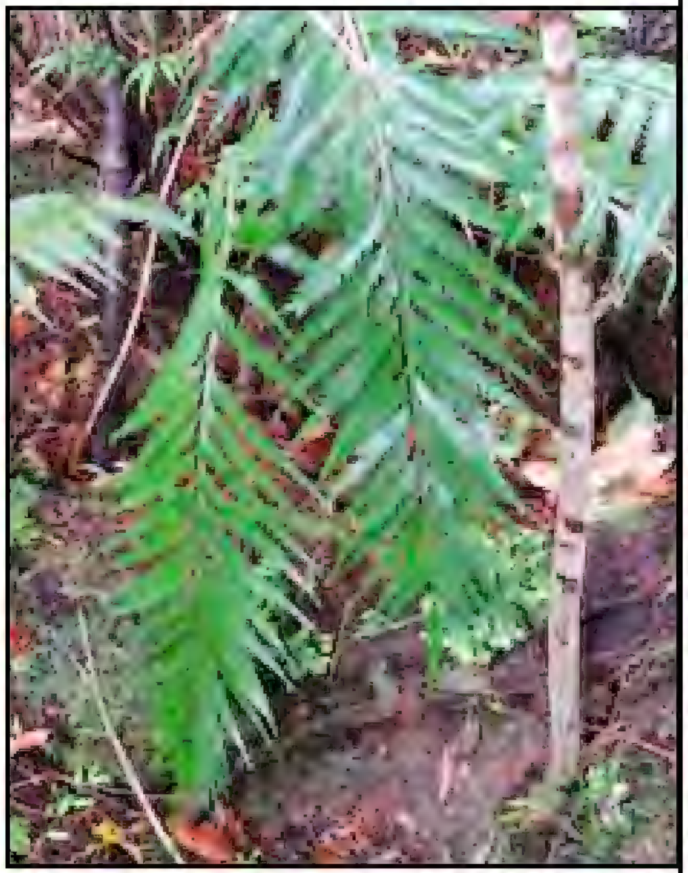

Fig. 14. *Asplenium scleroprium* with deeply toothed pinnae

Stewart Island – New Zealand Part 2

I do have a problem however with epiphytic *A.flaccidum*, which as often as not appears to grow on the ground, and *A. appendiculatum* (previously *A. terrestre*), which is always on the ground but is supposed to be more upright and generally more subdivided. At least half of the plants which are epiphytic and which approximate to pictures and drawings of *A. flaccidum* are curiously different from them, to the extent I keep asking myself if I have misidentified them, or the variation is greater than I anticipated. I have included a text book example of *A.flaccidum* (Fig. 15) with a few of the weirder variants or hybrids illustrated. Fig. 16 shows a possible hybrid between *A. flaccidum* and either *A. polyodon* or A. *scleroprium* The fern in Fig 17 is almost certainly a hybrid with *A.bulbiferum* from its size and vigour. That in Fig 18 looks like *A.bulbiferum*, perhaps crossed with *A. appendiculatum*.The later is shown in Fig. 19. More probably, they could be the products of irregular matings between two species of asplenium, something which is no rarity here on Stewart. Indeed, *A.bulbiferum*, which shouldn't need to hybridise to spread itself more widely, has a very bad reputation with its marked tendency to miscegenate and give rise to the many plants which I classify as *Asplenium mysteriosum*.

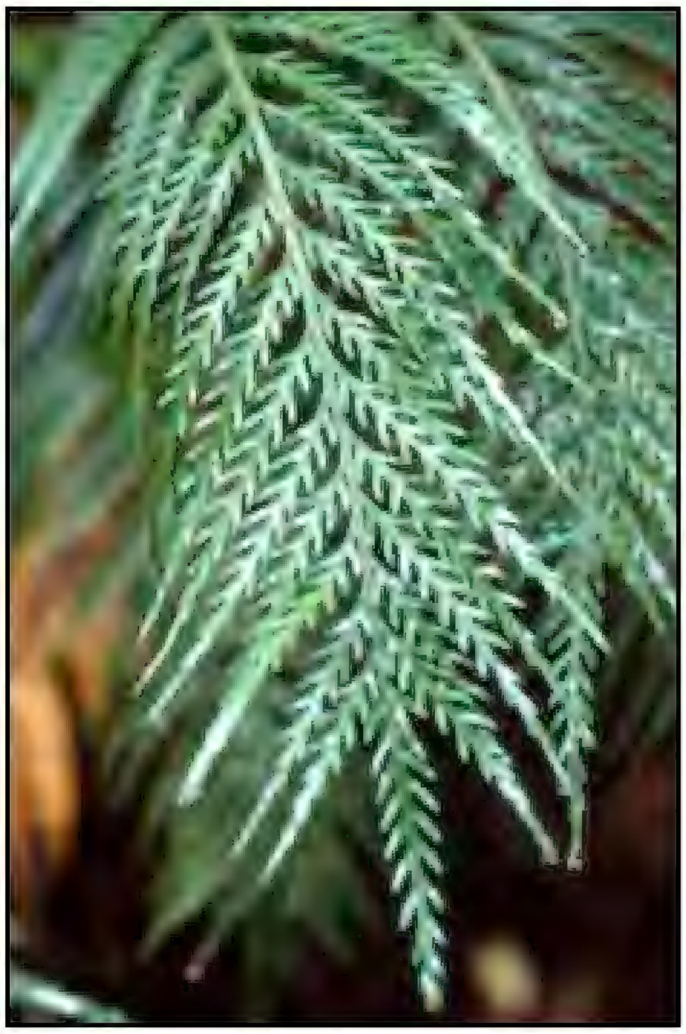

Fig. 15. Text book example of *Asplenium flaccidum*

My general impression of the trees on Ulva was biased by my liking for that very queer juvenile form of *Pseudopanax crassifolius,* which I noticed everywhere. It is really weird-looking and a prolific breeder almost becoming ground cover in patches (Fig. 20).

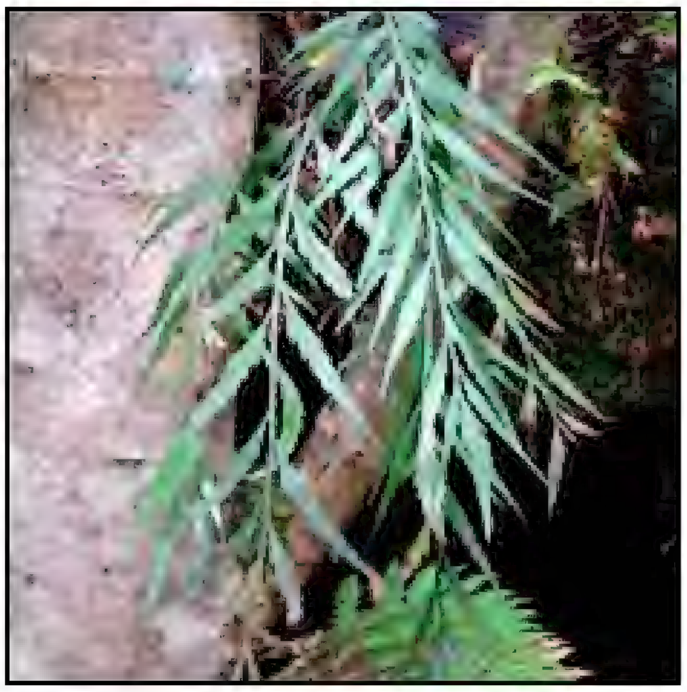

Fig. 16. Perhaps *Asplenium flaccidum* x *Asplenium polyodon* or *Asplenium scleroprium*

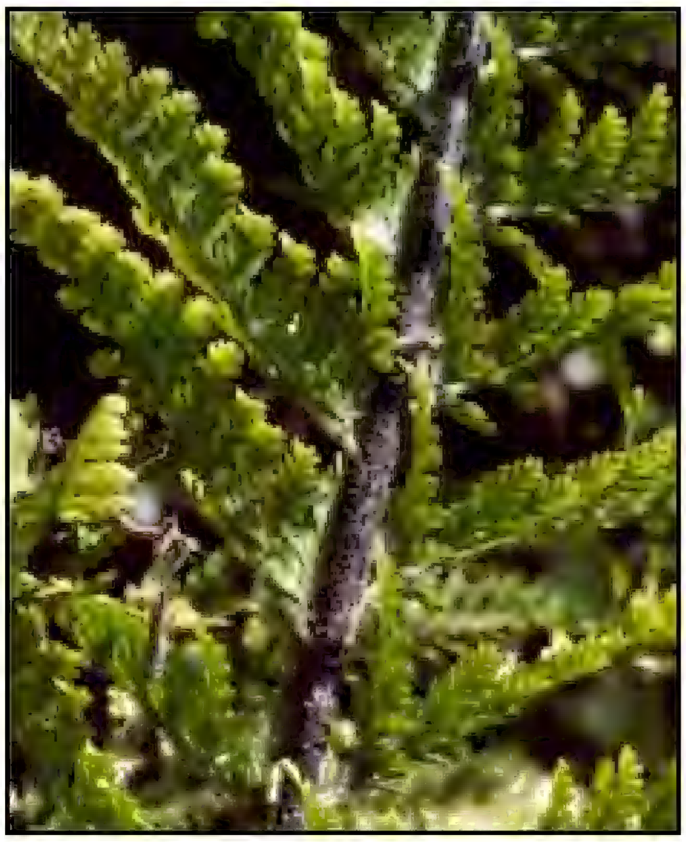

Fig. 17. Definitely has *Asplenium bulbocodium* as a parent

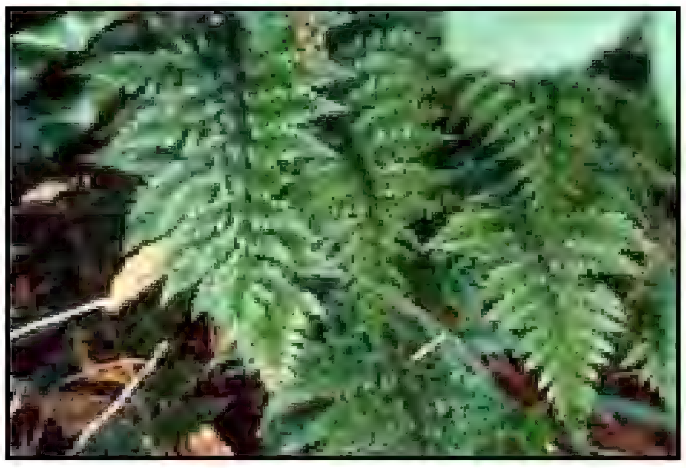

Fig. 18. Perhaps *Asplenium appendiculatum* x *Asplenium bulbocodium*

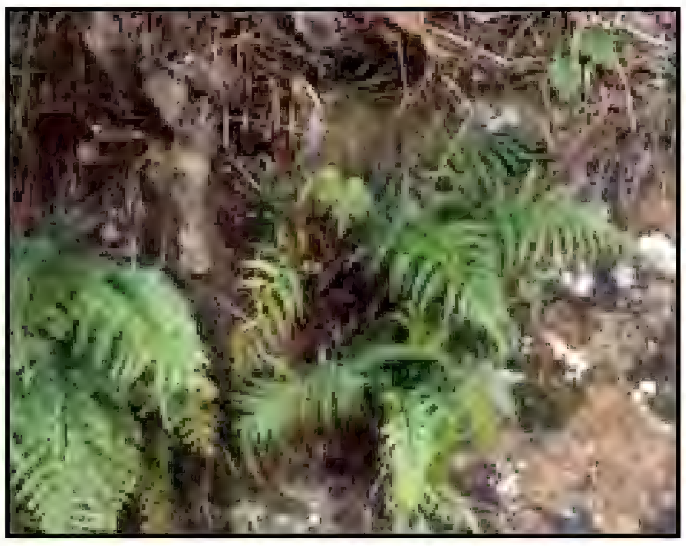

Fig. 19. *Asplenium appendiculatum* (ex terrestre)

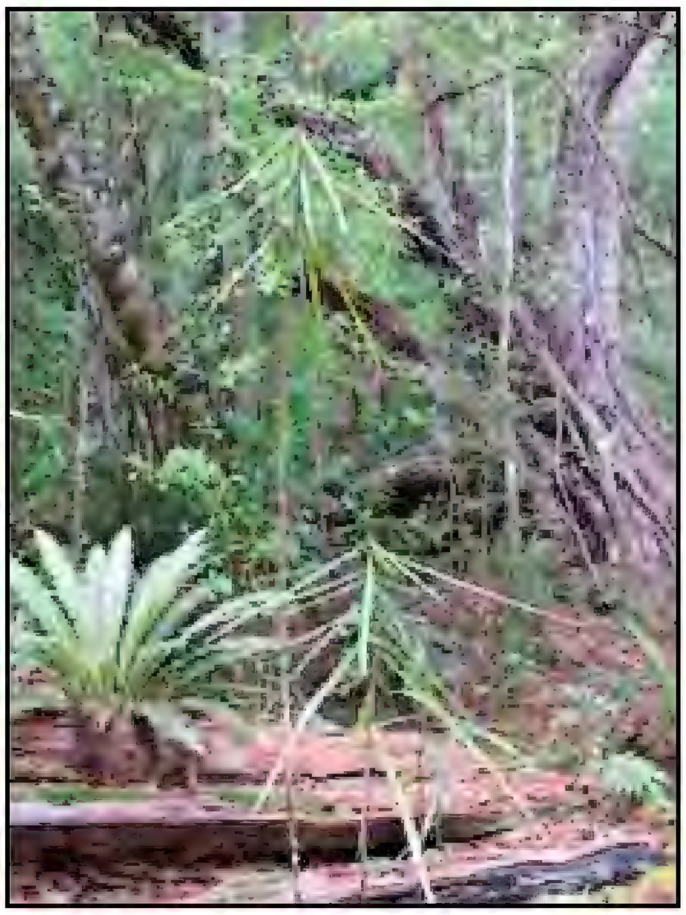

Fig. 20. Juvenile *Pseudopanax crassifolius*

Dacrydium cupressinum and *Prumnopitys hallii* produced quite a few youngsters as well as mature specimens (Fig. 21).

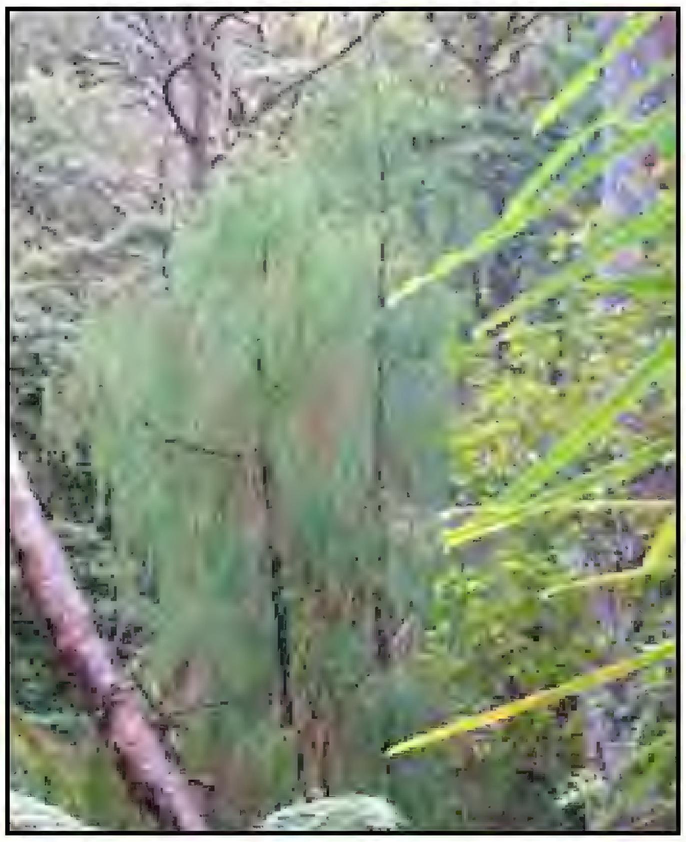

Fig. 21. *Dacrydium cupressinum*

I have no idea which was the most common tree because I didn't examine any of the tall trees. There were plenty of pittosporum look-alikes, probably including *Pittosporum colensoi.* Although it was well-wooded with considerable tangles of creepers, there were enough openings in the tree cover to support heavy fern growth. Ground cover comprised dead leaves and conifer stems with large patches of moss, filmy ferns or large ferns. Most prominent of the non-fern herbaceous plants was *Astelia fragrans*, with its bright leaves. Amongst all this greenery one can also enjoy the black stipes of *Dicksonia.squarrosa* or its golden brown dead fronds, the tree barks dappled white, grey and green. Everywhere were fallen tree trunks, home to so many fern species with their varying foliage and shining with recent rain.

Although tree ferns, particularly *D.squarrosa,* occurred frequently, the most prominent fern by far was *Blechnum discolor*. Older plants often have trunks; I have seen them up to a metre in length but usually bent when that long (Fig. 22). Plants are distinctly shuttlecock-shaped with mid to dark green fronds, and pinnae reducing in length proximally and distally giving a frond pointed at both ends. I have often come across plants with bright yellow young fronds or almost white (Fig 23).

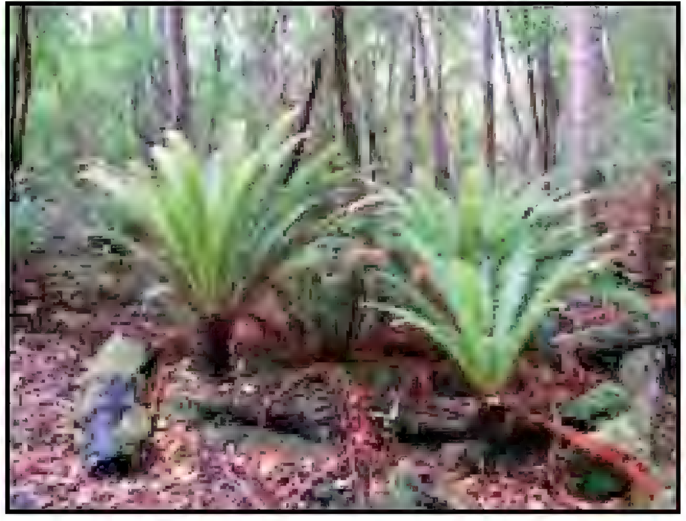
Fig. 22. Trunks of *B.discolor*

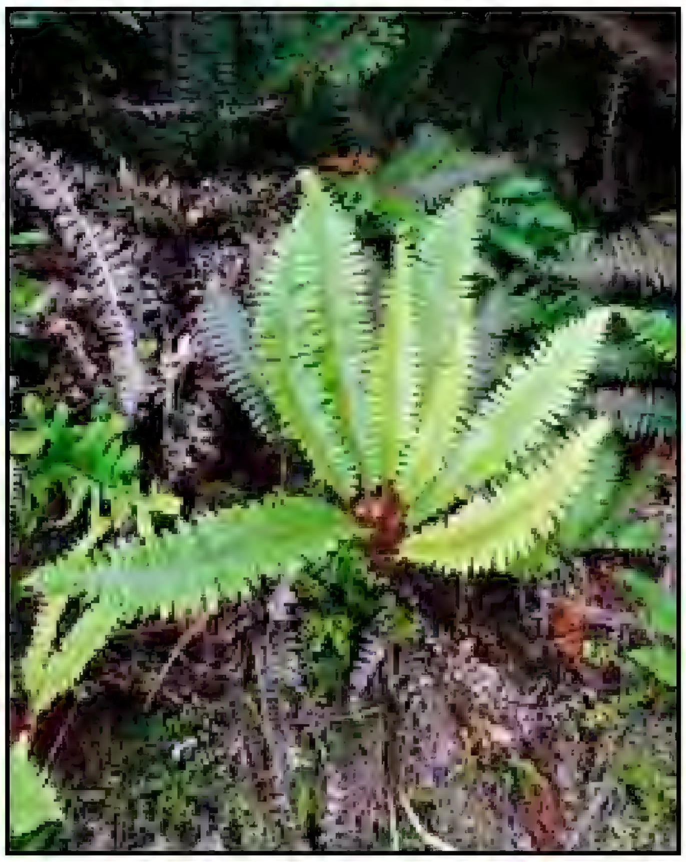
Fig. 23. Young pale green fronds of *Blechnum discolor*

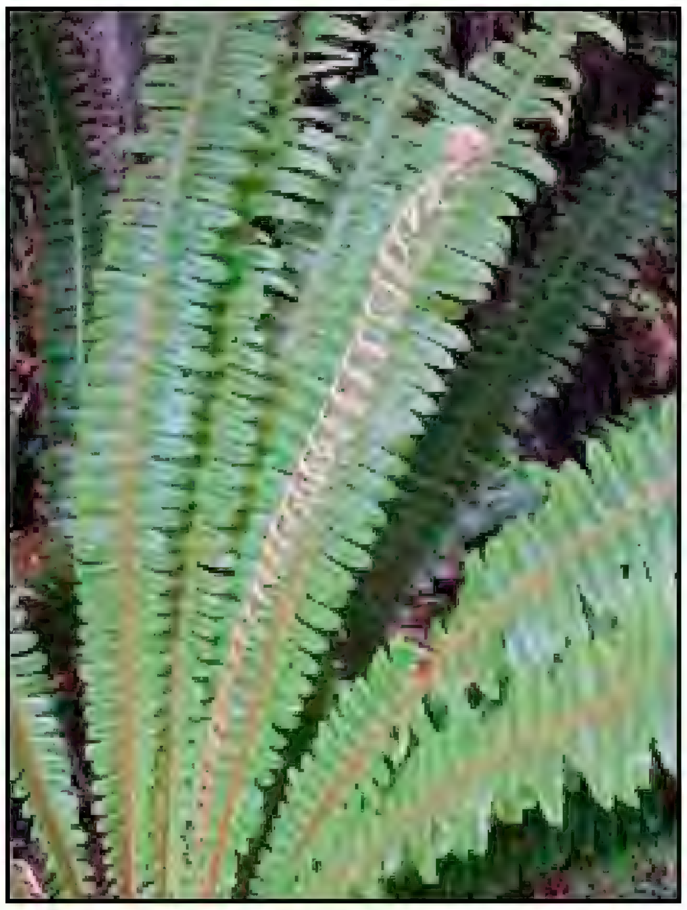
Fig. 24. New fertile frond of *B.discolor*

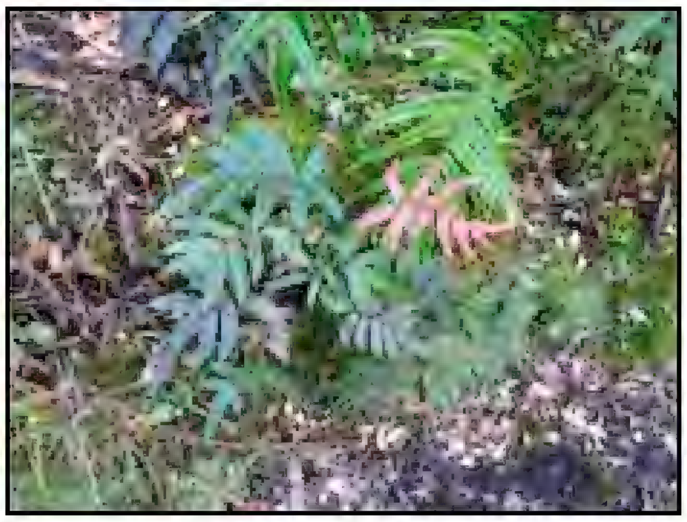
Fig. 25. *B.procerum* fronds of different ages

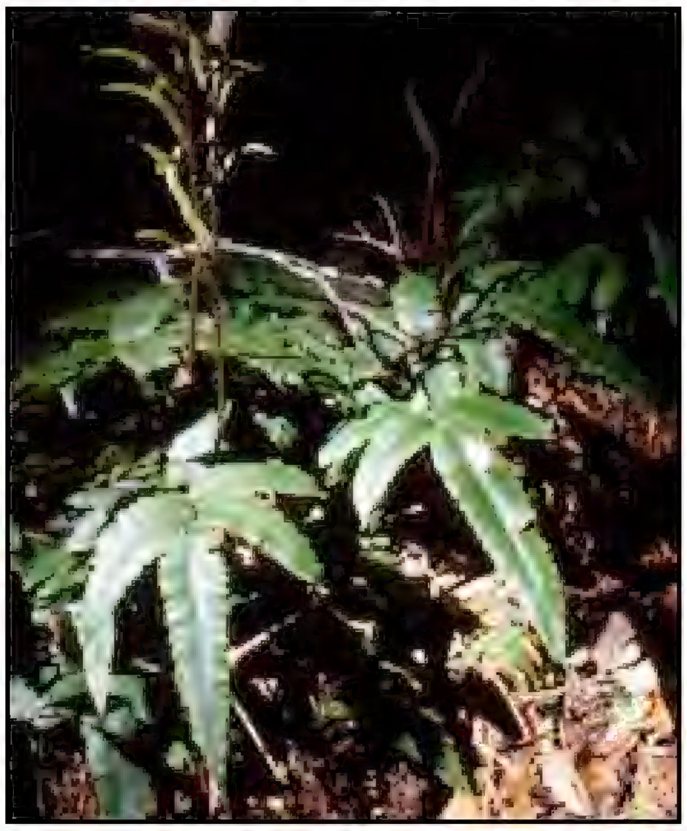
Fig. 26. *Blechnum procerum* with fertile fronds

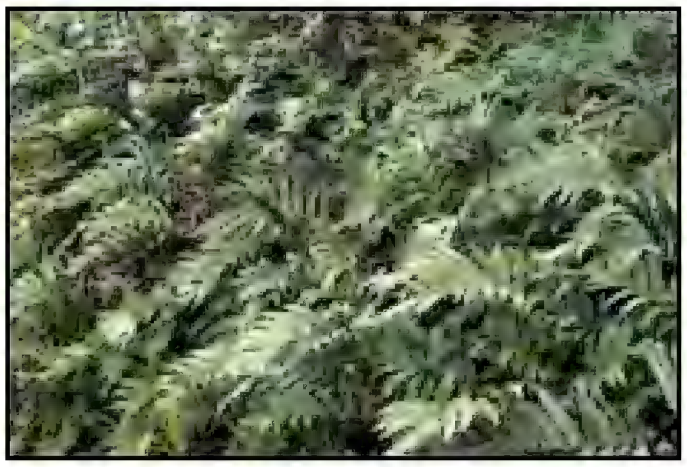
Fig. 27. Possibly *Blechnum minus*

While sterile plants are very neat, the rather ragged-looking fertile fronds do not add to their beauty, although catching them unfurling can be rewarding (Fig. 24). *Blechnum procerum* is much smaller than *B.discolor* and never so prominent but can form carpets of ground cover with its drooping or prostrate fronds. It has many fewer pinnae (2-12 pairs) slightly stalked, more spaced out and with a prominent distal pinna (Fig. 25). Fertile fronds are upright, slightly longer than the sterile ones and similarly sparse (Fig. 26). Even blechnums aren't perfect – they have to have species which cause problems for me. Having identified some clumps as *B. procerum*, I now think they are *B. minus* (Fig. 27). Reading Brownsey and Smith-Dodsworth's description [2000] of this so called 'swamp kiokio' is even more depressing. They say "it is only doubtfully distinct from *B. novae-zelandiae* and requires further study". My apparent *B.minus* had many more pinnae than *B.procerum* with quite tall upright fertile fronds having longer pinnae but it was only pint-sized compared to the barrel-sized *B.novae-zelandiae*. Fortunately for my sanity, the blechnum that I found in only one place on Ulva near Boulder Beach was pretty definitely *B. blechnoides,* although it was originally named after collector Sir Joseph Banks. My specimens were sickly yellow with short fleshy sterile fronds and fertile fronds half the size of sterile ones (Fig. 28). They were surrounded by plants of *Asplenium obtusatum*.

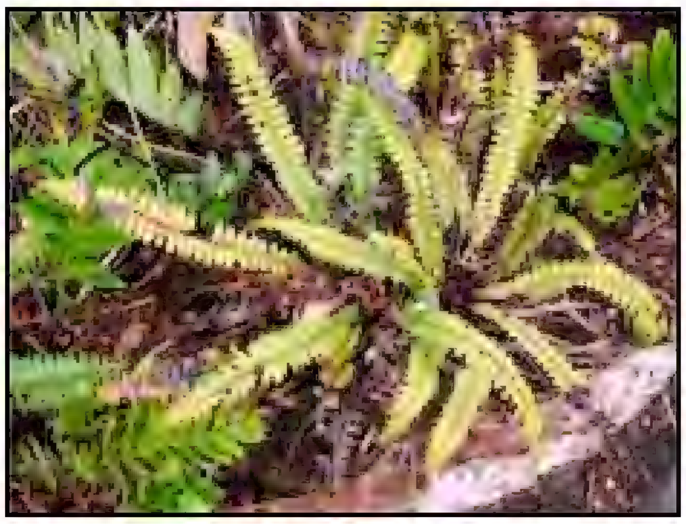
Fig. 28. Short fleshy fronds of *Blechnum blechnoides*

I saw all the other fern species already mentioned under Rakiura on the Ulva walks. More frequently observed here than elsewhere though was *Tmesipteris sp.*, probably *T. tannensis*, which is abundant both on upright and fallen trees and tree ferns, often with *Grammitis billardierei* or *Ctenopteris heterophylla*.

Overview

Only some of the Stewart Island pteridophytes are mentioned here. I didn't see (or perhaps notice) any lycopods (apart from the one I sat on!), Ophioglossaceae, Schizaea spp., gleichenids, several blechnums, most grammitis, one or two aspleniums, including *A hookerianum* shown in Fig. 29 on the next page but seen by me only on South Island. *Hypolepis spp.*, *Lastreopteris spp.*, *Polystichum richardii*. As for filmy ferns, I have no

Stewart Island – New Zealand Part 2

idea what I did or didn't see: I find them so difficult to identify from slides, even from small live specimens with the use of a lens and flora.

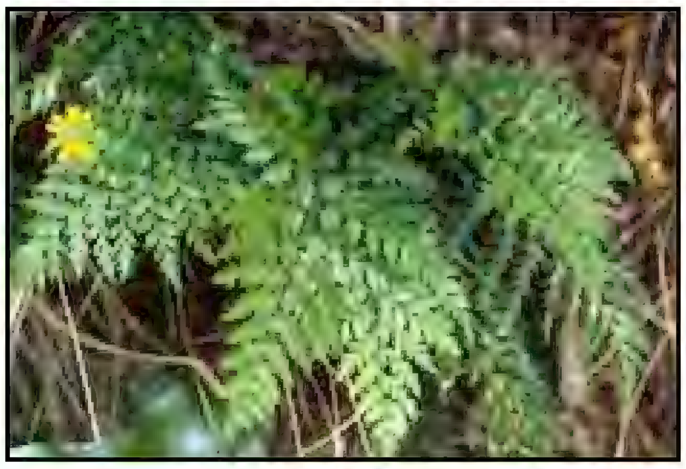

Fig. 29. Asplenium hookerianium

Advice

Some advice for anyone tempted to visit the islands. Although the view from the tiny passenger plane in January 2000 was superb, on my last visit in late February both my flights were delayed for several hours by fog so that I would recommend the ferry which always runs. The single hotel is central but it is also the pub and can be noisy. Further from the shore is a small motel. There is one general shop, a couple of cafes and there was a restaurant which I didn't try in 2015. Most visitors book into private houses which provide bed and breakfast, sometimes also evening meals and packed lunches. I have fallen on my feet on both visits – having been fed wonderful breakfasts by kindly hosts in lovely homes. I was particularly spoilt by Raylene on my last visit to Glendaruel house and its magnificent garden full of rhododendrons and tree ferns.

Several outfits run night trips to see kiwis as well as day trips to catch blue cod or visit particular sites. I particularly enjoyed a day going fishing for the local delicacy blue cod, partly because I enjoyed the extremely fresh fish for dinners and breakfasts and partly because our boat was mobbed by loudly quarrelling albatrosses, all fighting over the fish heads and guts thrown overboard.

Having given you readers a rain warning, I was bemused to see on the island's website a total fire ban in January 2018 due its extreme fire danger.

I very much hope some fern lovers will put Stewart Island on their holiday list as a result of reading this article.

Note: Very recently new names have been proposed for members of Blechnaceae [A new classification of Blechnum by Tim Pyner on the BPS website]. I have ignored them here because all my reference books were published before that and use old names. *B.blechnoides* , *B.chambersii*, *B. penna-marina* all become Austroblechnum spp.. *B.novae-zelandiae* and *B.procerum* become Parablechnum spp.. *B.discolor* changes to Lomaria, *B.fluviatile* to Cranfillia. I can't access information on the others.

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Websites of local government and National Parks service.

Publicity and Communications Officer
Sophie Walwin

e-mail: Publicity@eBPS.org.uk

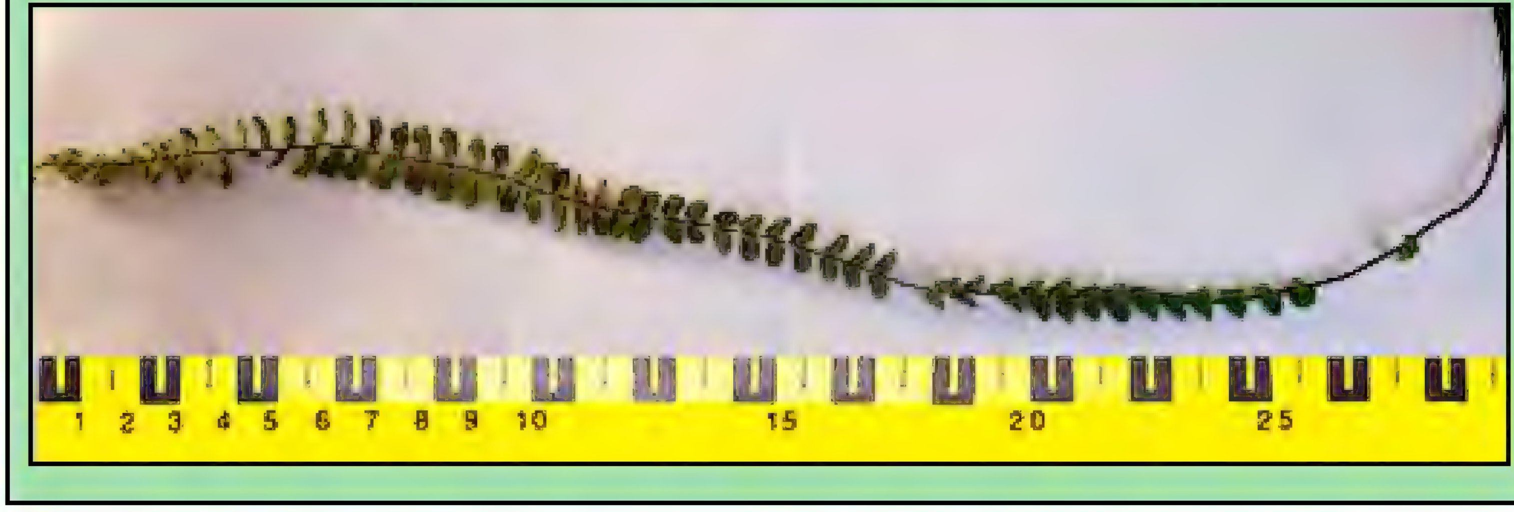
I have taken the position as Publicity and Communications Officer for the BPS, which was confirmed at the AGM. A recent graduate of the Kew Diploma in Horticulture with a passion for ferns, I have been a member of the BPS for a number of years (sporadically attending annual meetings and enjoying reading the *Pteridologist* magazine), and a BPS bursary recipient which enabled my two-week exploration of the deserts of Southern California and Arizona to find ferns in 2013.

My plan as the Publicity and Communications Officer is to promote the BPS, its activities and achievements, to members and others outside the Society. I will continue building our social media presence and keep the website fresh with updates and news of our events and happenings.

Enthusiasm for appreciating and growing ferns will feed into the way I communicate to you and the wider public, so I hope to inspire existing members and gain new ones.

I'd love members to send me ferny stories, information about events and photos which I can share with the society'.

How Big is Yours?



This *Asplenium trichomanes* subsp *quadrivalens* was found in South Cumbria this year. The rachis is 27cm long. Is this a record? Jermy and Camus in '*The Illustrated Field Guide to Ferns and Allied Plants of the British Isles*' say it can be up to 20cms long.I would be interested if anyone has found it even longer.

A.E.G

Equisetum as a Unique Colonist of Lightly-Used Railway Track Ballast

Christopher N. Page

Geobiology and Environment
Camborne School of Mines,
University of Exeter, Cornwall, UK
e-mail:pterido@hotmail.com

One of the strangest, but most regular, habitats for Equisetums (horsetails) in Britain, is as frequent colonists of railway track ballast. Here I offer a geo-biological interpretation of this unusual association, widely observed but seldom discussed or interpreted.

Railway track ballast is an unusual habitat, but one for which pteridophytes seem to have an occasional affinity, when other conditions are right. Of the horsetail species usually involved in such colonisations in many parts of the British Isles it is *Equisetum arvense* (Field Horsetail) which is certainly the most widespread, but I have also seen *E. sylvaticum* (Wood Horsetail) doing much the same thing in Scotland, and very occasionally I have found both *E. telmateia* (Great Horsetail – Gloucestershire, Devon), *E. x litorale* (Shore Horsetail – Devon), *E. x font-queri* (Skye Horsetail in Worcestershire and possibly Dorset), and as-yet unknown *Equisetum* hybrids (seen, as yet, only from passing trains in Berkshire and Shropshire) at least fringing along ballast margins. Lightly-used railway lines seem to be the main focus of colonisation by members of the genus, since more heavily-used mainline tracks seem too regularly hit by herbicide sprays to allow anything to grow.

Under lighter herbicide regimes horsetails can certainly colonise, and, on smaller branch-lines, older ballast tends to be retained for much longer. The main site I have been recording and use for graphic illustration here is on a preserved steam railway in South Devon. This example runs along the valley of the River Dart. *Equisetum arvense* occurs in several patches, which I have recorded for more than two decades to have expanded from several separate points to gradually merge into more continuous green 'runs'. Being a lightly-used line, with days of non-running, these sites are also more possible to get permission to examine in detail. This particular railway branch-line opened in 1872 (Gammell 1995), so the main structure of the line dates from then, but I have been able to more closely date the age of the existing ballast from the year-dates which are directly cast into the mouldings of the cast-iron track-chairs used to hold the track to the sleepers set upon it; these all give dates before the 1930s. Thus most of the track-ballast well-colonised by *Equisetum* is getting on for a century old. [Where else, except grave-yards, do you have pteridophyte habitats with the start-dates for colonisation actually cast on to their main structural components!].

What is it that attracts horsetails so often to this old railway track ballast, then?

Here, large patches of the horsetail now completely occupy some lengths of the ballast, in several places for than 100 metres or more. The summer green shoots cover these lengths of this track with an annual turf-like sward; the shoots die-down for winter, and abundant crops of cones arise during the first week of April every year. Indeed, the timing of the cone-shoot emergence over the 20-year period for which I have observed it is so regular that you could 'set your watch' (or calendar) by it (ancients perhaps did!). It varies hardly at all in schedule from year-to-year, irrespective of conditions during the previous winter. Such cone-shoots ensure that full spore-output is regularly maintained, and hence life-cycle turnover through prothallial success among the shaded stone interstices is quite possible. The affinities of the horsetails for this ballast made me research exactly what the ballast is, to see if any particular bio-geo-chemical links emerged.

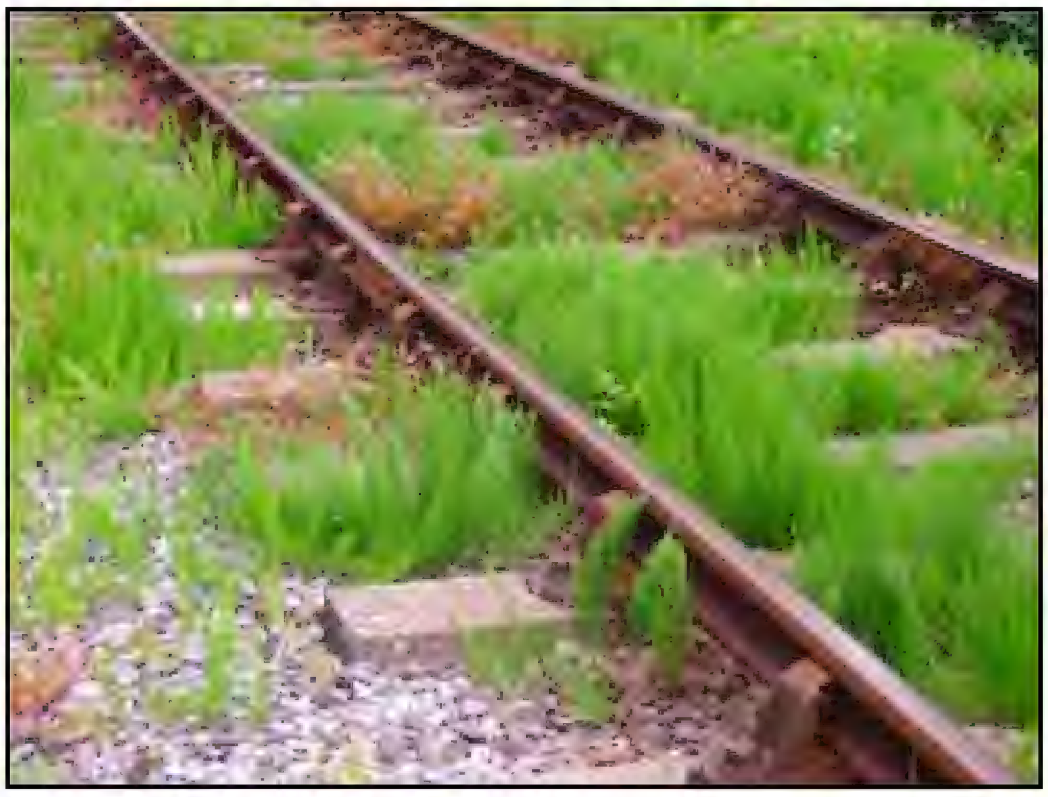


Fig. 1. Close-up view of typical *Equisetum arvense* growth amongst old hornfels rail ballast, South Devon, UK, early Summer

Track ballast, of broken pieces of remarkably-uniform angular stone, is a habitat that appears at first sight to be a remarkably hostile one for any plant. It is free-draining, and covers whatever ground is beneath it in a continuous mass of heavy broken fragments. Research I have done on the ballast itself, however, shows it to be often quite specific in rock type and source. The rock which is widely used for this purpose is called hornfels (Page 1987). It is a hard rock of metamorphic origin, which has long been particularly quarried and widely utilised as railway ballast. Much is obtained from a dedicated ballast-quarry in Mid-Devon: Meldon Quarry near Okehampton (Durrance et al 2019). All of the minerals are small-grained in this rock, and hence mesh tightly together in the rock matrix; it therefore lacks cleavage-planes, giving the rock its strength. Hornfels rock is thus preferred for good engineering reasons. It is particularly hard and strong in load-bearing, and referred to as having a high crushing-strength; it is said to be one of the strongest materials quarried in the British Isles (Harris et al 1974). For use as ballast, it is crushed into 1-3 inch-sized lumps (everything to do with railways is still in old money), and the crushing and sieving process after quarrying of the rock produces the preferred sharp, angular fragments, containing zero fines (i.e. no components of finer texture than 1 inch). Breaking this rock produces particularly sharp-edged cubical or especially roughly pyramidal wedge-shaped fragments. This keeps the ballast maximally well-draining (so maintaining the wooden sleepers), and its angular fragments tend to settle and lock down with age, thus enhancing their hold of rail and sleeper positioning (round pebbles, by comparison, would tend to move).

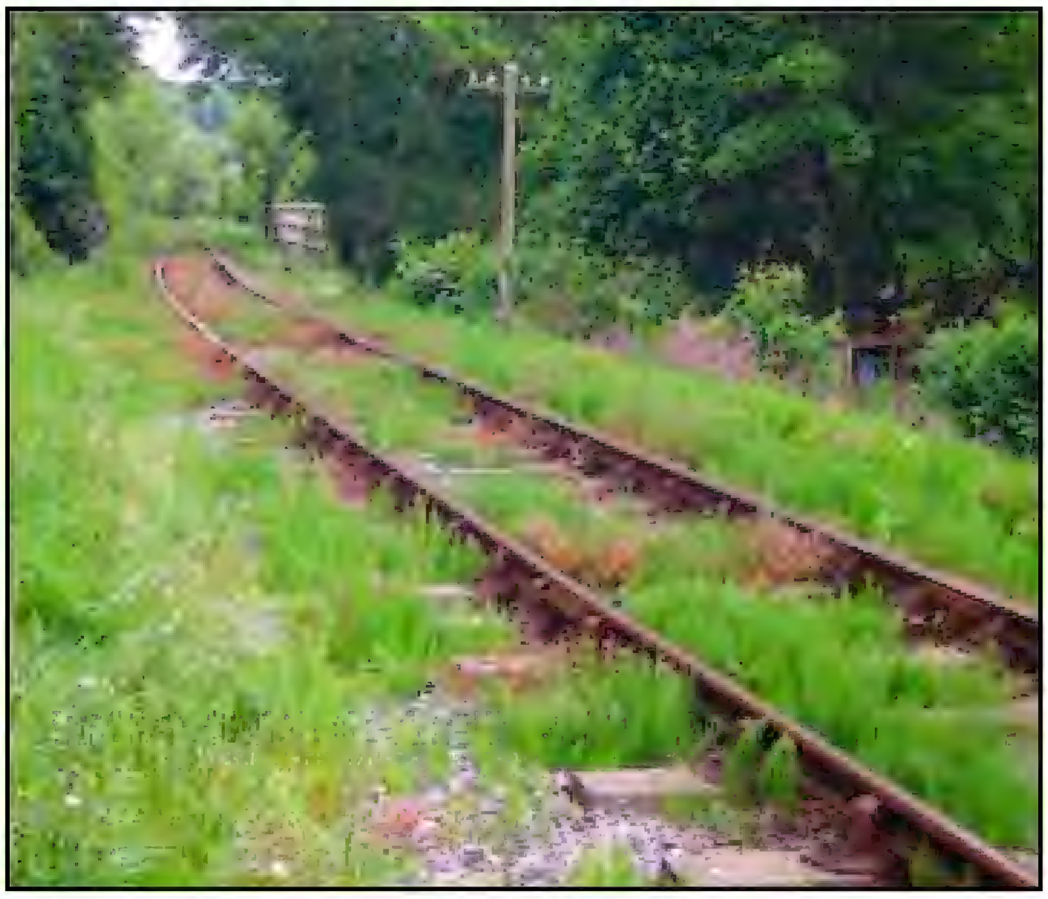


Fig. 2. Longer-view of typical extent of site-occupancy of rail ballast along actively-used rail-track site by pure *Equisetum arvense* merged colonies, South Devon, UK, early Summer

So much for the physical aspects; it is these plus the chemical aspects and geological origins of the rock that prove to be especially revealing. Hornfels is not a simple mineral, but contains a relatively complex, and slightly variable, array of different mineral components, including crystals of quartz, graphite, iron oxides, pyroxenes, plagioclase, mica and feldspar, and can include some chert, calcite and dolerite. Elements present include Si, Ti, Al, Fe, Ma, Mg, Ca. O (Stewart 1982). Being a metamorphic rock, it is derived from heat and pressure effects on original mixed rock types, which include especially shales, mudstones, and clays, and may also have been mixed with original sandstone and limestone layers (Yardley 1989). And here seems to lie the key. Observations across Britain and Ireland have already shown that rock exposures which contain complex mixtures of shales and clays inter-bedded with sandstones and limestones weather to offer especially rich habitats for *Equisetum* (in contrast to ones of either pure sandstones or pure limestones, which form *Equisetum* deserts). This gave rise to my earlier deductions (Page 1987, 1998) that all species of *Equisetum* thrive over mineral substrates which combine both silica-rich sources and calcium-rich ones in combination. Such substrates especially include clays, mudstones and shales, where such mineral combinations can be held in plant-available form. Equisetums hence do not grow where either of these silica or calcium elements occur without the other, but thrive is where such Si + Ca combinations are found.

As hornfels, so widely used for railway ballast, is a metamorphosed form of such original mixed sedimentary substrates, including clays, mudstones and shales, this points strongly to a reason for its habitat-suitability for *Equisetum* – both silica and calcium are each available in it in combination. Hornfels weathers only slowly, but, however modestly these elements may be yielded, degradation will inevitably take place (the horsetails say so!), and they are likely to accumulate in soil-layers beneath the ballast, available for the horsetails to access. Horsetails and hornfels seem made for each other! Also considering railways have been around for only about 150 years, and *Equisetum* for approaching 250 million years, such adaptation to railway ballast exploitation shows well how flexible and adaptive the ecology of these particularly ancient plants can still be. *Equisetum* remains the oldest living genus of vascular plants on Earth, and that an important part of this adaptation appears to be that they are impressively good geologists!

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The Whitwell Fern Garden, Kendal

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Early in 2018 several BPS members had been helping a group of volunteers recreate the ‘Whitwell Fern Garden’ in Kendal. The Kendal Conservation Volunteers (KCV) are pleased to announce that the Whitwell Fern Garden has won a Gold Award in the 2018 Kendal In Bloom competition. The Whitwell Fern Garden is located adjacent to Serpentine Cottage, next to the entrance to Serpentine Woods on Queens Road, Kendal.

On 23 September 1891, at the inaugural meeting of the Northern British Pteridological Society, George Whitwell became a founder member and Hon Secretary. He resided at Serpentine Cottage for fifty years from 1875 to 1924 during which time he collected and cultivated ferns in his garden.

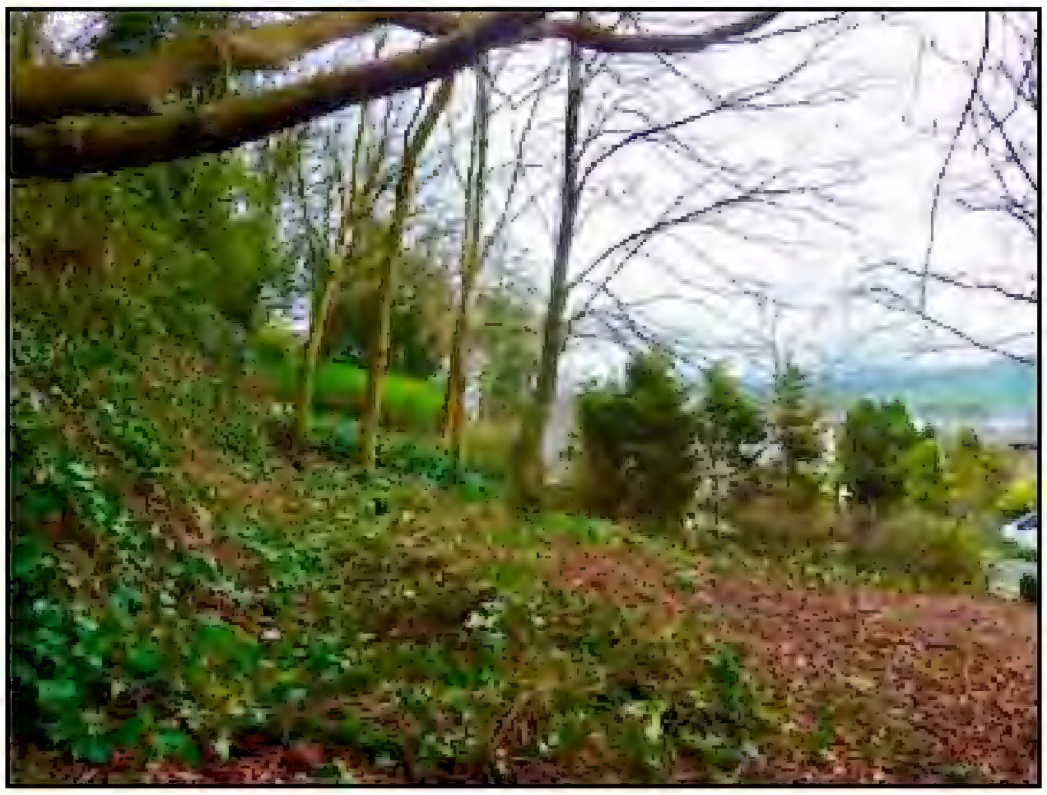
Whitwell was an active BPS member who developed his passion and knowledge and became a recognised authority of Lakeland ferns with several articles published in the British Fern Gazette.

Recent research into the history of Serpentine Woods revealed the Whitwell connection through his role as Superintendent of the Serpentine Walks and his passion for Lakeland ferns. Several Victorian artefacts discovered in Serpentine Woods support the assumption that Whitwell cultivated his fern garden at Serpentine Cottage.

He was a renowned fern collector but following his death in 1924 a large proportion of his fern collection was sold to the BPS Vice President Mr Alexander Cowan of Penicuik and most of the plants were moved to Scotland. Over the intervening years Whitwell’s fern garden became neglected reverting to a dense carpet of ivy, brambles and tree saplings.

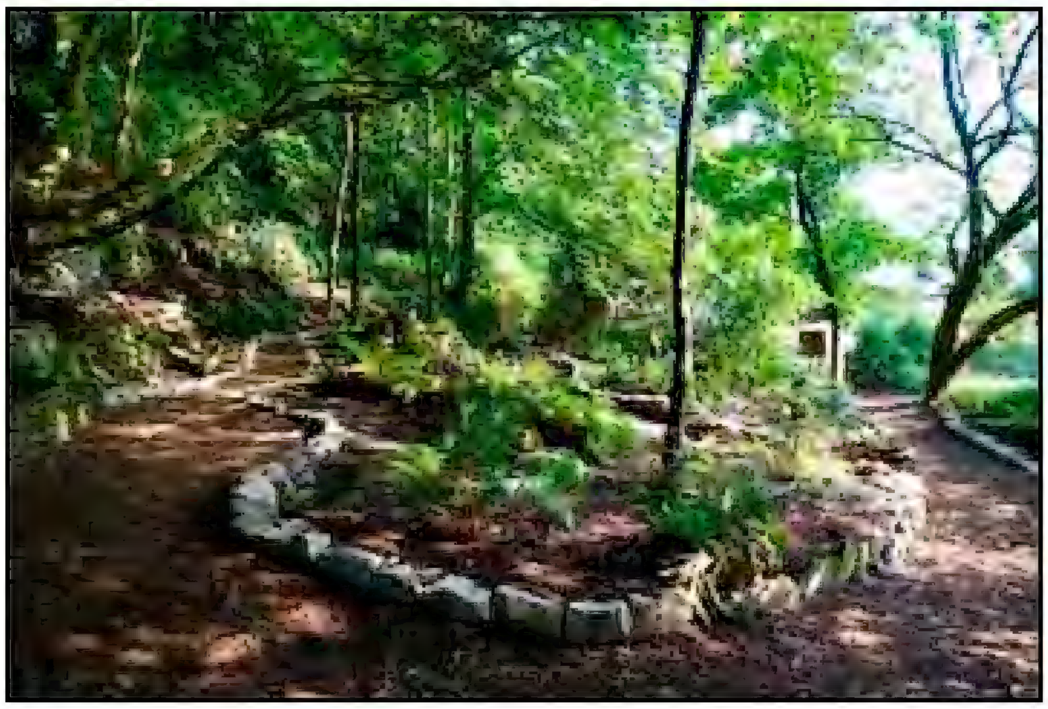
In spring 2018 the Kendal Conservation Volunteers began a regeneration project to clear the area to develop a fern garden for local residents and visitors to enjoy.

The encroaching vegetation was cleared from the site, rock terrace and retaining walls were revealed and rebuilt, and beds and paths constructed using stone donated by local residents. During the renovation work the remains of a stone building, possibly Whitwell’s tool shed, were revealed. On completion of the hard landscaping a range of ferns have been planted in the garden including several varieties associated with Whitwell.



The Whitwell Fern Garden April 2018

The success of the project relied on generous donations of materials and ferns from the local community and many hours of volunteer labour. The project was enhanced by the Pteridological advice and fern donations from several BPS members and from ferns donated from national fern collections at Sizergh Castle and Holehird Gardens. The garden impressed the Kendal In Bloom judges who announced a Gold Award at the recent awards ceremony.



The Whitwell Fern Garden August 2018

The BPS on Instagram

Chris Nicholson

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730 Great Western Road, Glasgow G12 0UE

e-mail: chris.nicholson10@btinternet.com

It was around about a year ago that, clutching my iPhone to my chest, I first ventured into the selfie infested waters of social media. I set up an Instagram account (@polystachya) for photos of the orchids I grow for my job at Glasgow Botanic Gardens. Shortly after that I joined the BPS Education Committee and took over the BPS Instagram. The account had been started by Razvan Chisu (@razvanchisu) but due to his many and varied horticultural commitments he no longer had the time to carry it on. If you have read any of the newspaper reports recently about the toxic activity on Instagram you will be thinking me very brave indeed; fortunately the horticultural world inhabits a much kinder social media space.

So what goes on? What is all the @ating and #hashtagging about? I was happily oblivious to the workings of Instagram before I joined and, forgive me for assuming in this article, that a good proportion of the Pteridologist readers are too and for providing a brief explanation.

Instagram is an online platform from which people can post and share photos. Anyone can look at the photos posted on public accounts - but you have to have an Instagram account to participate by for example following, liking, commenting or putting up your own photos (Fig. 1).

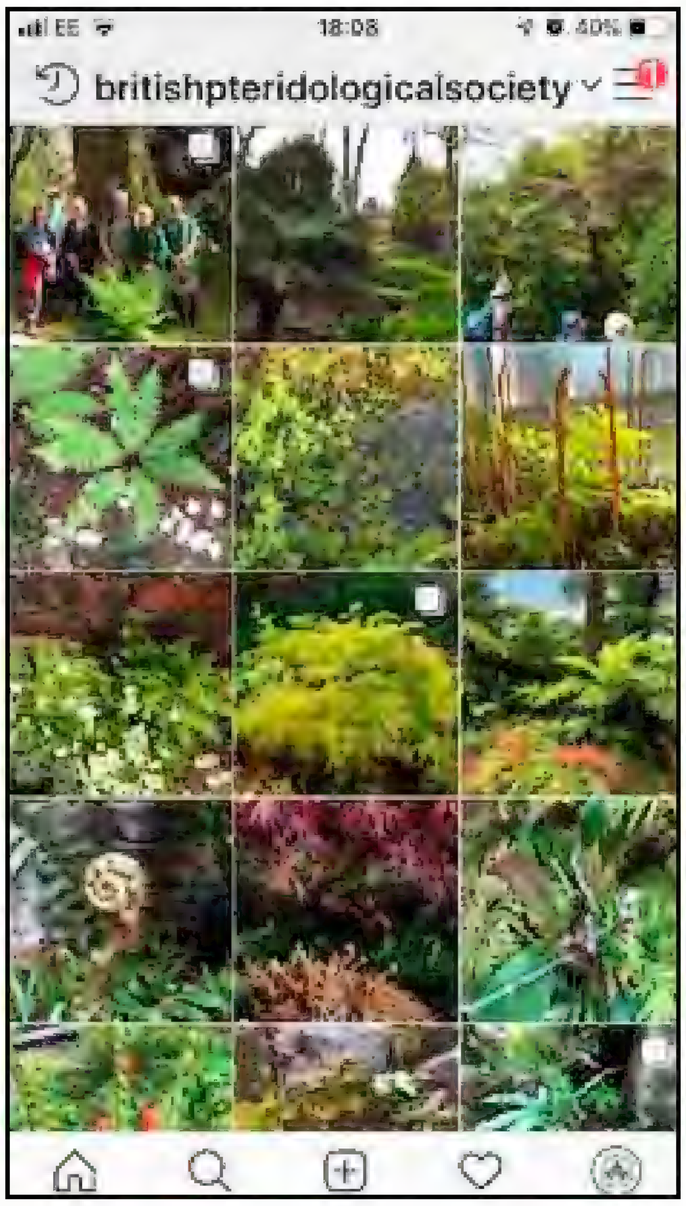
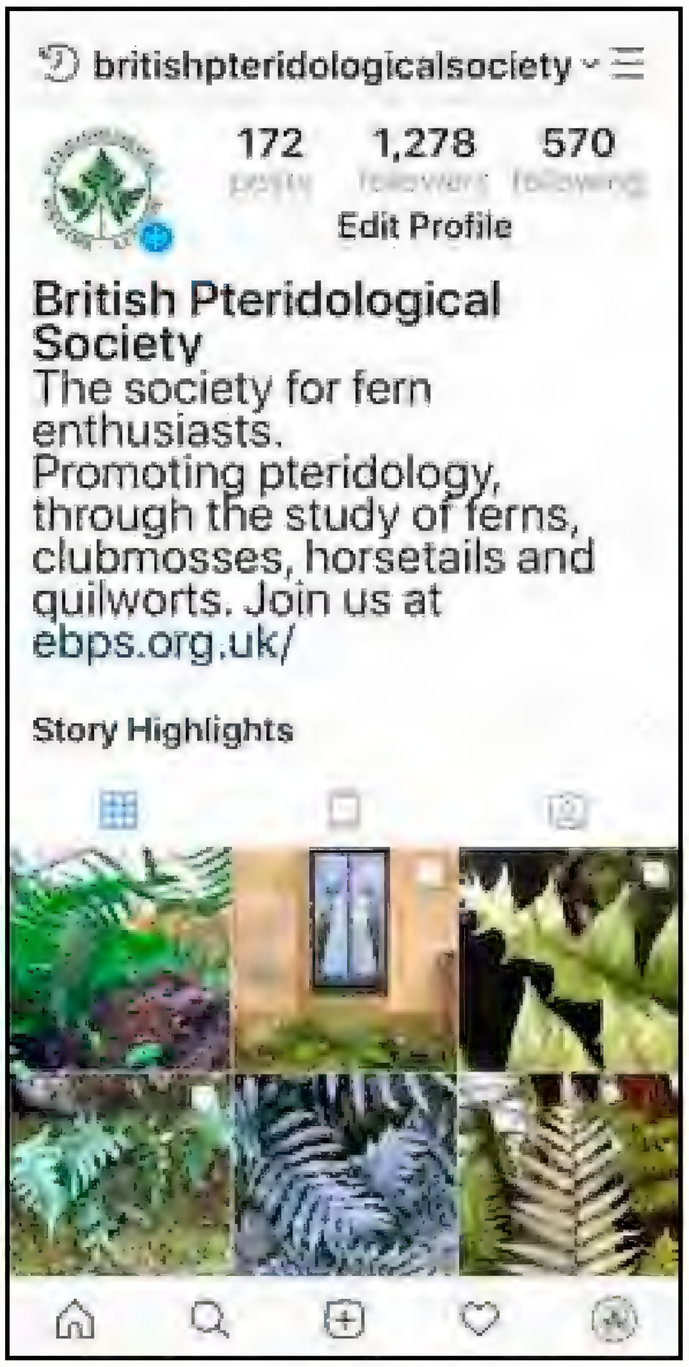


Fig. 1. Screen shot of gallery of BPS posts

At the time of writing (26 Feb '19) the BPS has 1278 Instagram followers, see Fig. 2 That means that every time I post a photo it appears in the feed, also called home screen of each of those 1278 people. Whether a follower sees the photo depends how often they check their feed, the volume of posts in it and how diligent they are in looking; but assuming they do see my ferny photo they may choose to like it by tapping the heart icon under the photo or they may make a comment on it. This is where it can all get a bit addictive – I will admit to a brief phase where I became obsessed with the number of followers accumulated, the number of likes a post received and any 'celebrity' traffic (Figs. 3 & 4)

As well as posting a photo I can also add a commentary, for example the name of the fern, where it is from etc. To increase the chances of other people seeing the photo I can add hashtags into the commentary. These hashtags are a bit like a searchable catalogue reference or index that can lead people to a post. For example: in the screen shot in Fig. 4 I have written #elaphoglossumcrinitum, anyone searching for that hashtag will find a



britishpteridologicalsociety

172 posts 1,278 followers 570 following

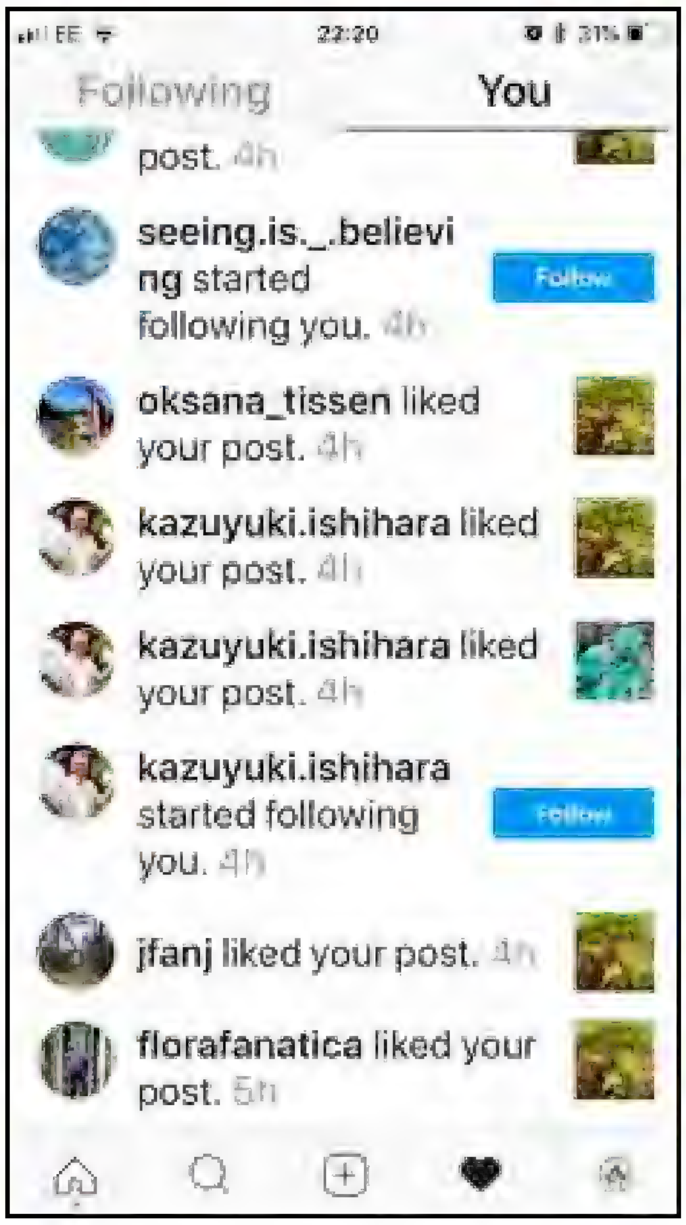
Edit Profile

British Pteridological Society

The society for fern enthusiasts.
Promoting pteridology, through the study of ferns, clubmosses, horsetails and quilworts. Join us at ebps.org.uk/

Story Highlights

Fig. 2. BPS Instagram profile & bio



EE 22:20 31%

Following You

post. 4h

seeing.is._.believing started following you. 4h Follow

oksana_tissen liked your post. 4h

kazuyuki.ishihara liked your post. 4h

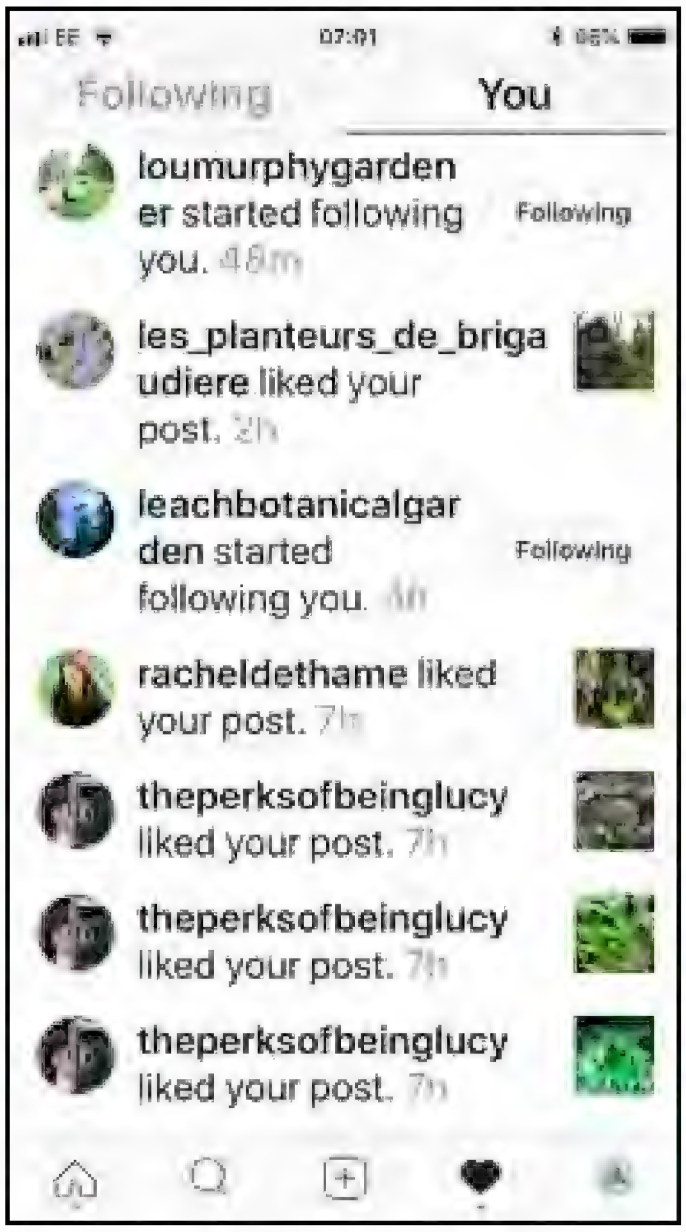
kazuyuki.ishihara liked your post. 4h

kazuyuki.ishihara started following you. 4h Follow

jfanj liked your post. 4h

florafanatica liked your post. 5h

Fig. 3. Celebrity likes – Kazuyuki Ishihara, Chelsea gold medallist



EE 07:01 96%

Following You

loumurphygardener started following you. 48m Following

les_planteurs_de_brigaudiere liked your post. 2h

leachbotanicalgarden started following you. 4h Following

racheldethame liked your post. 7h

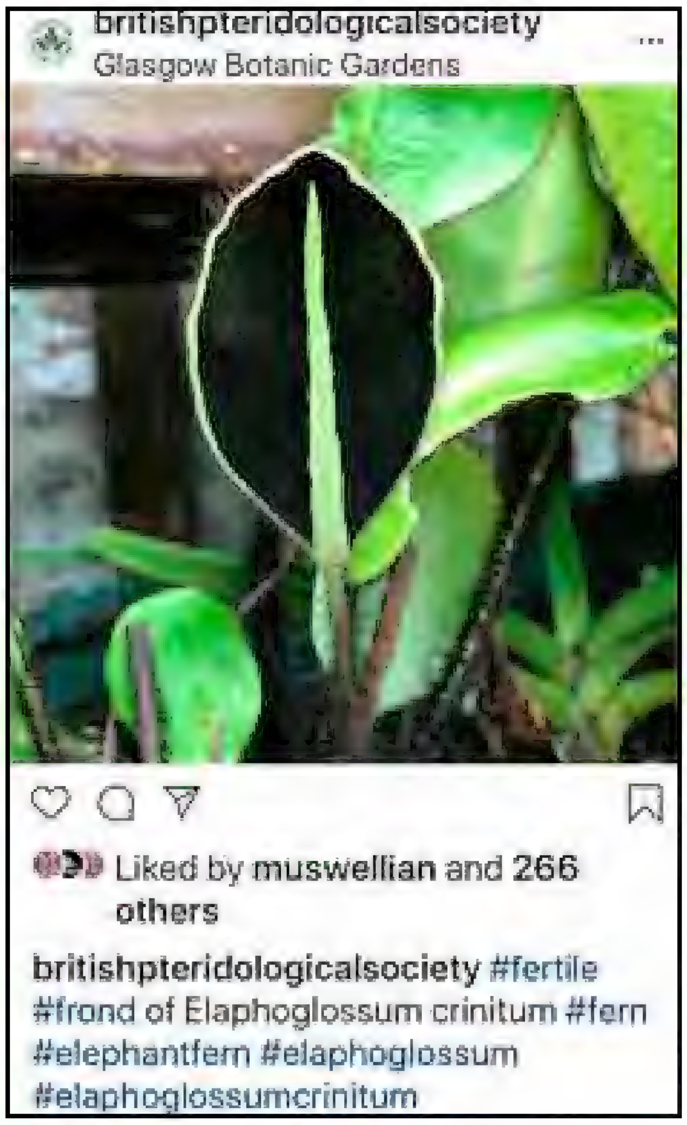
theperksofbeinglucy liked your post. 7h

theperksofbeinglucy liked your post. 7h

theperksofbeinglucy liked your post. 7h

Fig. 4. Celebrity likes – Rachel de Thame, television presenter

collection of all the posts that have included #elaphoglossumcrinitum and hopefully see mine. I can search #fern to find other ferny posts (Fig. 5).

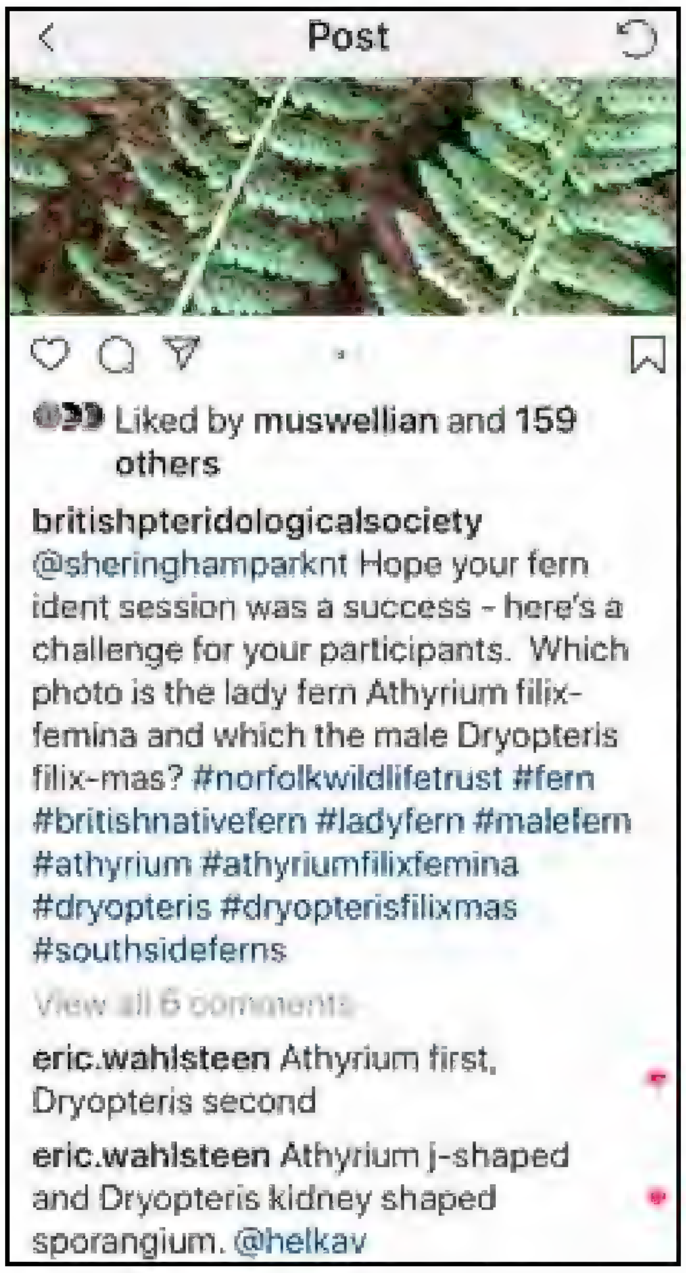

britishpteridologicalsociety
Glasgow Botanic Gardens

Liked by muswellian and 266 others

britishpteridologicalsociety #fertile #frond of Elaphoglossum crinitum #fern #elephantfern #elaphoglossum #elaphoglossumcrinitum

Fig. 5. Screen shot of post of *Elaphoglossum crinitum* note the hashtags in the commentary

If I want a particular Instagram user to see my post, I can tag them in the commentary; for example: In the screen shot below I have tagged @sheringhamparknt to ask how their fern ident event went (Fig. 6).



Liked by muswellian and 159 others

britishpteridologicalsociety @sheringhamparknt Hope your fern ident session was a success - here's a challenge for your participants. Which photo is the lady fern Athyrium filix-femina and which the male Dryopteris filix-mas? #norfolkwildlifetrust #fern #britishnativefern #ladyfern #malefern #athyrium #athyriumfilixfemina #dryopteris #dryopterisfilixmas #southsideferns

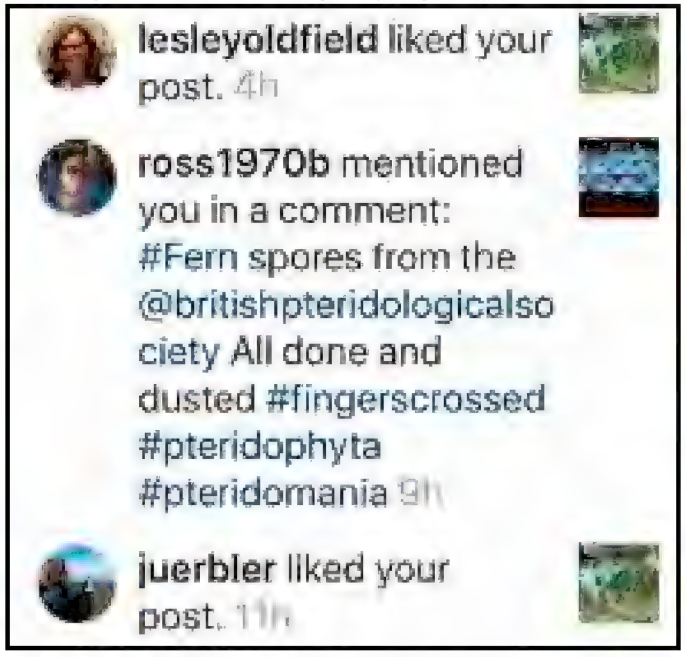
View all 6 comments

eric.wahlsteen Athyrium first, Dryopteris second

eric.wahlsteen Athyrium j-shaped and Dryopteris kidney shaped sporangium. @helkav

Fig. 6. Example of Sheringham Park National Trust tagged

If someone wants the Fern Society to see their post they can tag @ britishpteridologicalsociety. In the screen shot below ross1970b has tagged the BPS in the commentary on his post about sowing his spores from the spore exchange (Fig. 7).


lesleyoldfield liked your post. 4h

ross1970b mentioned you in a comment: #Fern spores from the @britishpteridologicalsociety All done and dusted #fingerscrossed #pteridophyta #pteridomania 9h

juerbler liked your post. 11h

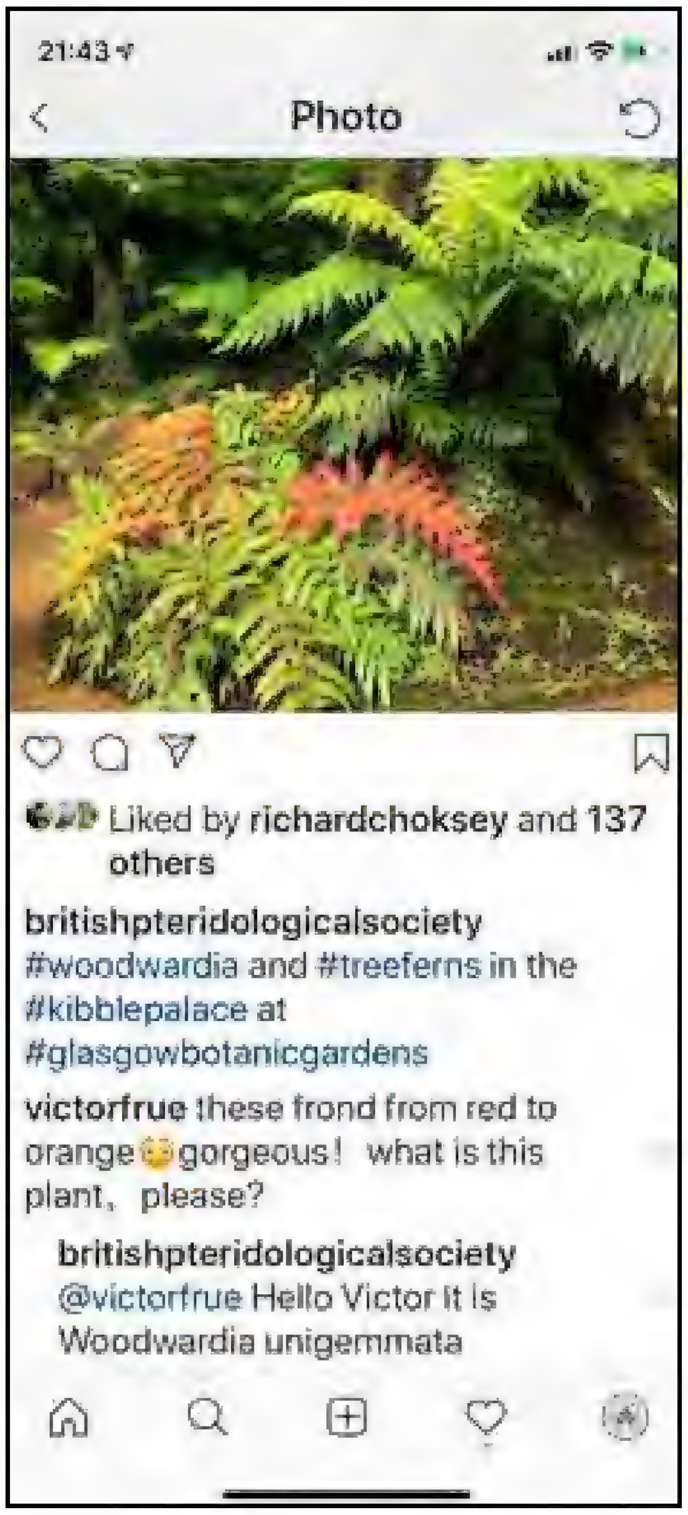
Fig. 7. Example of BPS tagged

So what is the point? On a personal level I enjoy taking photos and sharing them with other people and I enjoy looking at other peoples' photos. Instagram is also an effective platform to promote interest and appreciation of ferns and the activities of the BPS. Individual posts frequently get over 100 likes, often between 200 – 250. The most a post has had is 372 (I am not sure why that post was so popular – it was not my best photo –perhaps the #nooksandcrannies lured unsuspecting punters in). The comments and questions people make are an opportunity for the Society to interact directly with people who may or may not be members.

For example, in Fig. 8 there is a question from Victor Frue asking about the identity of a fern.

I am based in Glasgow and most of my posts for the BPS have been from Scotland. I would like, going into my second Instagram year to better reflect the national and international membership of the BPS and its activities. To do this I need your help. Any beautiful ferny themed photos could be posted – the screen shot below includes a photo of Nepalese fern stamps taken by Alan Godfrey which was liked by 215 people (Fig. 9). In particular it would be great to have photos from the regional field meetings and events and shows the BPS has participated in. Please email photos to instagram@ebps.org.uk and give me some basic information for example the name of the photographer (and their Instagram user name if they have one) the name of the fern, where the photo was taken. Please make sure, if your photo includes people that you have their consent for it to be posted on Instagram.

Finally please do go online and have a look @britishpteridologicalsociety



Liked by richardchoksey and 137 others

britishpteridologicalsociety #woodwardia and #treeferns in the #kibblepalace at #glasgowbotanicgardens

victorfrue these frond from red to orange😊gorgeous! what is this plant, please?

britishpteridologicalsociety @victorfrue Hello Victor It is Woodwardia unigemmata

Fig. 8. Question from Victor Frue, who is not a member of the BPS

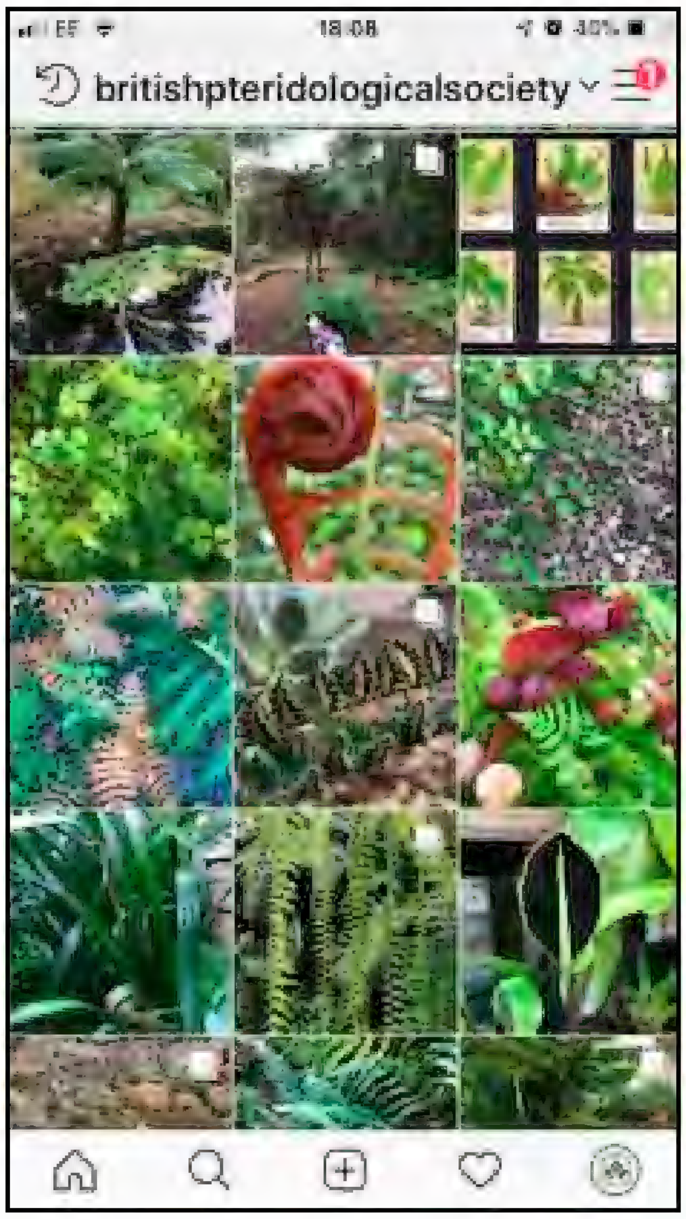


Fig. 9. Instagram gallery of posts including Nepalese fern stamps (top right)

The New Zealand Fern Artists

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Albums of New Zealand ferns are the most commonly seen of all fern albums in private and public collections, both in New Zealand and in England. The majority of these were created between about 1860 and 1900 and very many of them have the ferns mounted in a unique style, with the cut end of the fern stipe being decorated with a collection of small pinnae of unrelated fern species, moss, lycopods, and occasionally lichens. The creators of such items were often referred to as 'artists' in the local press, and a number of the fern mounters advertised themselves as 'fern artist' in local directories. As well as the creation of albums, sets of ferns mounted on thick card and decorated in a similar style were produced both by individuals, for their own satisfactions, and by commercial producers. This article aims to identify some of the factors which led to the development of this unique style of mounting, which is rarely seen in material produced outside Australasia.

Between 1840 and 1900 European immigrants to New Zealand increased the population from a few tens of thousands to almost one million. The majority of these settlers came either directly from England, where the 'fern craze' was at its height, or via the Australian colonies. As early as 1846, William Swainson was offering for sale, with limited success, sets of ferns mounted as herbarium sheets. He described these as ideal presents to send back to England, but was unable to give definitive names to many of the species that he had collected in the Hutt Valley. A decade after Swainson first offered New Zealand ferns for sale, Joseph Hooker published Florae Novae Zelandiae, an expensive volume, written in Latin, and of limited accessibility to the general population of Auckland. Pioneer collectors, such as William Colenso and Andrew Sinclair, who had both collected with Joseph Hooker, sent much material back to Kew and to the British Museum, as well as to the Auckland Museum. These early collectors were helping to establishing knowledge of the New Zealand flora.

The lack of a flora accessible to the general population led Emma Stanley Jones, the young wife of the Commissary General, to produce, in 1861, a small booklet. Handbook of the Ferns of New Zealand, based largely on her translation of Hooker's Latin flora. Fourteen years later, Helena Leech, the daughter of an eminent barrister, produced a second booklet Ferns which grow in New Zealand. These booklets, both of which were published anonymously in Auckland, were welcomed by the local press and reflected the growing interest in collecting ferns amongst the writers' social set. In Victorian England at this time, such young ladies would have been expected to spend their time practising social skills such as singing, recitation, water colour painting, embroidery, flower arranging, and many other 'elegant arts'. The writing of books by ladies was not so widely approved, which is maybe why the two booklets by Emma Stanley Jones and Helena Leech were published anonymously. But the opportunities for young ladies in Auckland were very different from those in London and it is here postulated that collecting, naming and mounting local ferns became established as a new one of these 'arts'; and it was an art which could be practised by both sexes.

By the time that the commercial production of fern albums and cards was established by Thomas Cranwell and Eric Craig in Auckland in the mid-1870s, the decorative style of mounting had become the norm. There are earlier press reports of fern decorated pictures and fern albums being displayed or entered into competitions, but personal collectors rarely dated their work, so other approaches must be used to identify early decorative items. Anton Seuffert, the foremost cabinet maker in Auckland, was producing elaborate drop front boxes for fern cards as early as 1860, so their making was well established by this date. These boxes were expensive items when produced, and are even more expensive now, selling for many thousands of pounds. The changing of the names assigned to ferns can help date early items.

Examples from one set of eighteen early fern cards that made its way from New Zealand, first to India, then to England in 1867, are shown in Fig. 1. The cards are unusually small, 7.5 x 11cms. The beginnings of the New Zealand style of mounting can be seen in these cards. In fig 1a two pinnae of Paesia scaberula (here labelled with the earlier name of Pteris scaberula) placed either side of a pinna of Hymenophyllum bivalve. In fig 1b the central lycopodium is flanked by pinnae of similar size. In fig 1c, an unlabelled pinna of Pneumatopteris pennigera is flanked by two smaller pinnae. In all of the examples the cut ends of the stipes are covered by a loose arrangement of moss. The creator of these arrangements, to whom the names of many of these ferns were still unknown, is trying to create a small picture on each card. Eight of the eighteen cards are unlabelled.

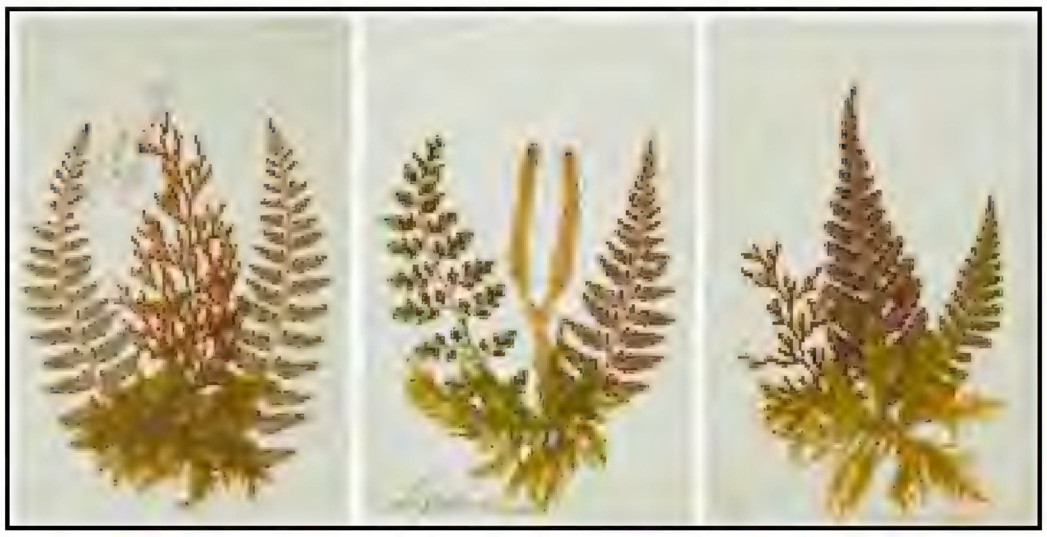

Fig. 1. Early fern cards, 7.5 x 11cm, created prior to 1867 (Barrie Stevenson)

Various explanations have been given for the placement of moss over the cut ends of the stipes, but Eric Craig told a journalist, in later years, that the decoration of the cut ends was intended to represent the earth from which the ferns were growing. This seems a plausible explanation when studying this set of cards. Later cards generally have a much tighter arrangement of moss, but some arrangers did arrange their specimens rising from an extended horizontal base of moss.

As the population of New Zealand increased, a cottage industry developed producing fern albums and fern cards, often advertised as ideal presents to send 'home' to England (as had Swainson at an earlier date). In 1870 there were 10,000 British soldiers based in New Zealand and this large transient military population during the native wars was an additional potential target for the fern mounters. Production was at first chiefly in Auckland, but, after the finding of gold in South Island, the population of Dunedin exploded and this also became a centre of production. Examples produced by commercial mounters from Auckland and from Dunedin are described.

Thomas Cranwell (1847-1907) had come to New Zealand as a young boy. He trained as a singing teacher and eventually became head of music for the Auckland township. He started to sell fern albums at the age of 23, in 1870, and most of the examples seen are from the early part of his career. All of his albums were cased in wooden covers, the majority with chip carved mottled kauri, using the most expensive grades of the wood. He went on to commission from Anton Seuffert a small number of albums with marquetry covers. All of his output was of the highest quality, aimed at the top end of the market. He also advertised fern cards, but these are very rare and the only set I've seen is of folio size, housed in an elaborately carved wooden box. As his career as a singing teacher progressed he probably limited his output to specific commissions.

Pages from a Cranwell album dated 1876 are shown in Fig 2. The style of mounting used in fig 2a is one which he only occasionally used and the decoration could well be interpreted as representing the ground from which the ferns are growing. The style of fig 2b is one which he used for the majority of his pages. The symmetry of his decorative style is not matched by any other fern mounter. He typically placed pairs of matched pinnae in the horizontal plane, then added a small central descending pinna. He then added small ascending fern pinnae, lycopods or mosses. In the smaller albums they are usually, as here, symmetrically positioned.

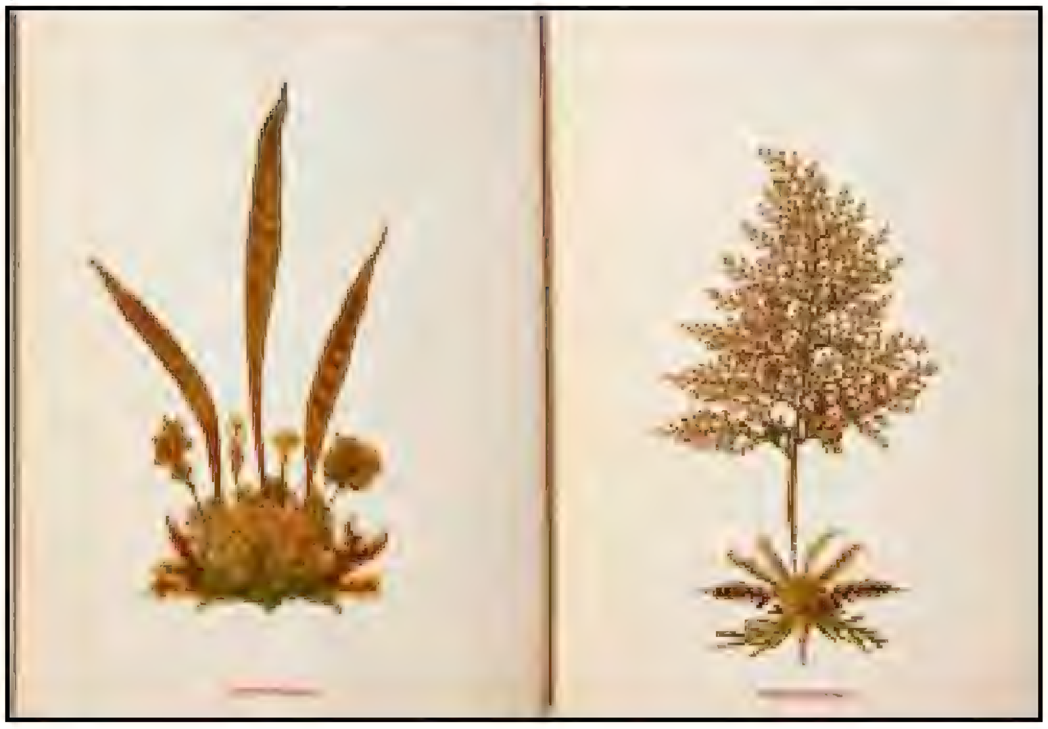

Fig. 2. Thomas Cranwell, fern album, 28cm high

The skill and beauty of Cranwell's arrangement is best appreciated in his larger albums or cards. The card illustrated in fig 3 shows the strong symmetrical arrangement of the base from which the sterile and fertile fronds of Blechnum fluviatile rise. Individual strands of two mosses rise from the base, on either side of the principal fronds.

Eric Craig (1829-1923) went to seek his fortune in the gold fields of Australia before moving on to Auckland in 1854. After an abortive career as a builder, he eventually opened his 'Fern and Curiosity Shop' in Auckland and was the supplier and creator of a very wide range of ferns, fern cards and fern albums for over 25 years. His first advertisements appeared in 1875 and, in contrast to Thomas Cranwell, his commercial instincts led him to create items for all levels of the market. Because of his long selling-career, his items are the most frequently seen of all the commercial producers in New Zealand. Most fern mounters arranged their specimens in random order, but Eric Craig always arranged the specimens in the order of the local flora, starting with the Gleichenia and ending with Tmesipteris.

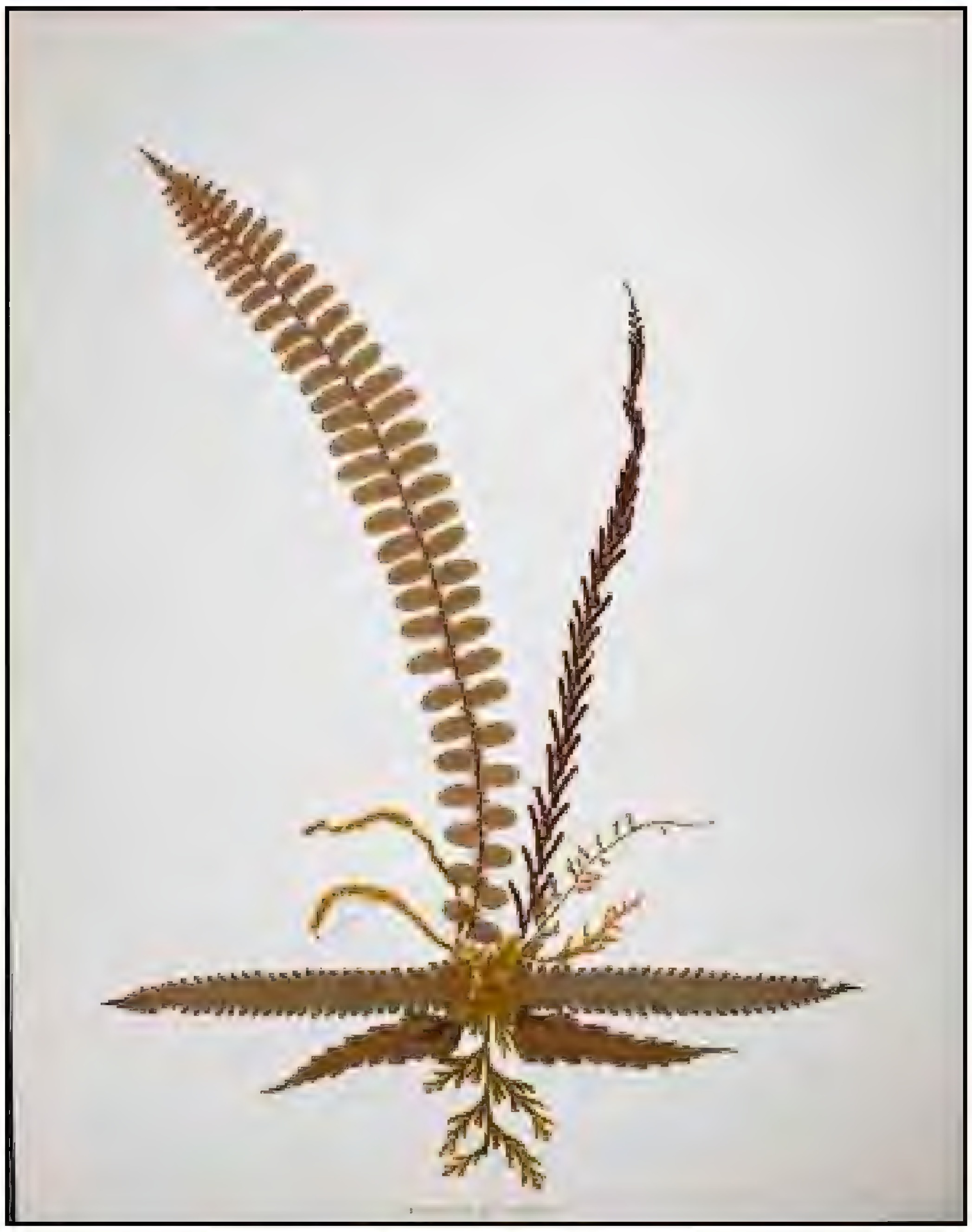

Fig. 3. Thomas Cranwell, large fern card, 36.5 x 46.5cm

Eric Craig used fern pinnae to decorate the frontispiece of each album. In his quarto sized albums, one small arrangement was placed above his shop stamp, and a second arrangement below. The frontispieces of his folio sized albums are more elaborate, consisting of a lithographic print of a ferny location surrounded by a garland of ferns. His most expensive albums, which could contain up to 152 specimens, also included photographs either side of the lithograph (Fig. 4a). The example shown has a small portrait of Eric Craig on the left and the New Zealand maori 'king', Matutaera Tawhiao, on the right. The moss used on this montage has been dyed a vivid green, as has some of the moss on the specimens in the album. Craig's style of decorating his specimens (Fig. 4b) is in marked contrast to that of Thomas Cranwell, with the decorative pinnae arranged at odd angles and no attempt at symmetry.

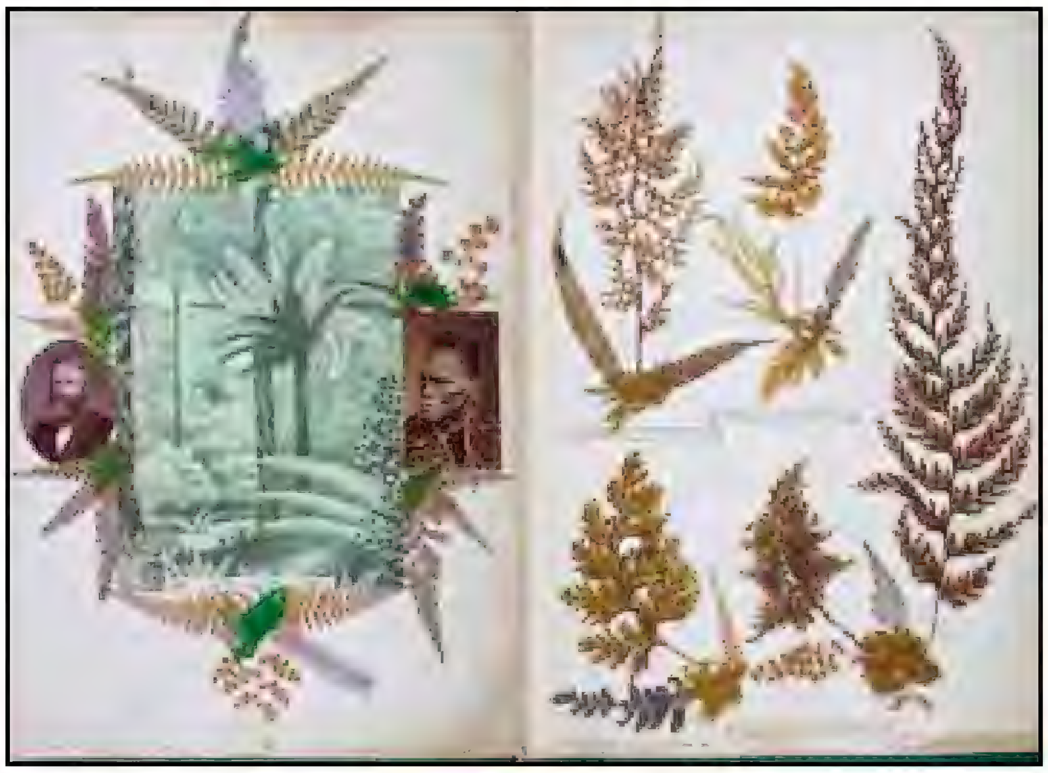

Fig.4a (left and 4b (right) Eric Craig, large album 46 cm high

a) collage frontispiece b) mounting style

Individual small cards (Fig. 5) also show asymmetrical decoration.

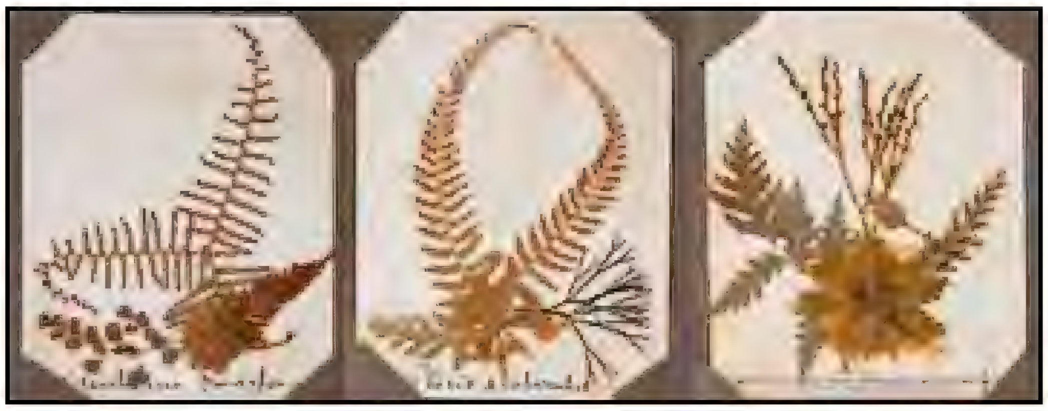

Fig. 5. Eric Craig, small cards, 10.7 x 13cm, slotted in brown paper backing

Mrs. C.C. Armstrong (1838-1910) had married Charles Armstrong in Melbourne in 1858. He supplied groceries and other goods to the workers in the gold fields. He moved to Dunedin in 1861 and the family followed. With thirteen children to bring up and a husband in and out of bankruptcy, she started to create and sell fern albums and collages in the late 1870s, her husband collecting the specimens for her. The family returned to Melbourne in 1887 and she continued to produce albums of New Zealand and then of Australasian ferns for a few more years. She was one of the first individuals to list themselves as a 'fern artist', as did her son, Charles Clark junior, who established a photographic business in Dunedin after the family left. He collected New Zealand ferns for his mother in Melbourne and also made his own albums and cards, which are frequently erroneously listed as his mother's work.

Mrs. Armstrong made two principal types of item. She produced sets of cards joined at the edges to form a z-fold album, which she advertised as 'panoramas'. She also produced quarto sized cloth bound albums. The styles of mounting the ferns varies between the two classes. In the smaller items the cut end of the stipe is covered by a dense roundel of moss, often with a decorative pinna coming from either side of the moss (Fig 6a & 6b). In her larger items these lateral pinnae are very often omitted. Mrs. Armstrong also produced for sale albums of collages, photographs surrounded by a garland of fern fronds or pinnae. The subjects that she used were chiefly of New Zealand scenery or of Maori people. The illustration shown (Fig 6c) is from an album containing eleven collages with the photographs showing buildings and street scenes in Dunedin, alternating with pages with ferns mounted in her usual style.

Sarah Annie Reid (1867-1962) was a daughter of William Reid of Dunedin. He had been a nurseryman and seedsman in Dunedin, selling his original business and opening a florist's shop in 1885. When the Armstrong family returned to Melbourne in 1887, William Reid started to sell fern albums and panoramas from his shop. William had become a collector of ferns and of the seeds of native New Zealand plants. Early albums had a shop label 'William Reid', but it is likely that all of the material was being made up by his teenage daughter and he soon gave her a personal label 'Miss A. Reid' and wrote an effusive flyer advertising the quality of the albums that she was producing.

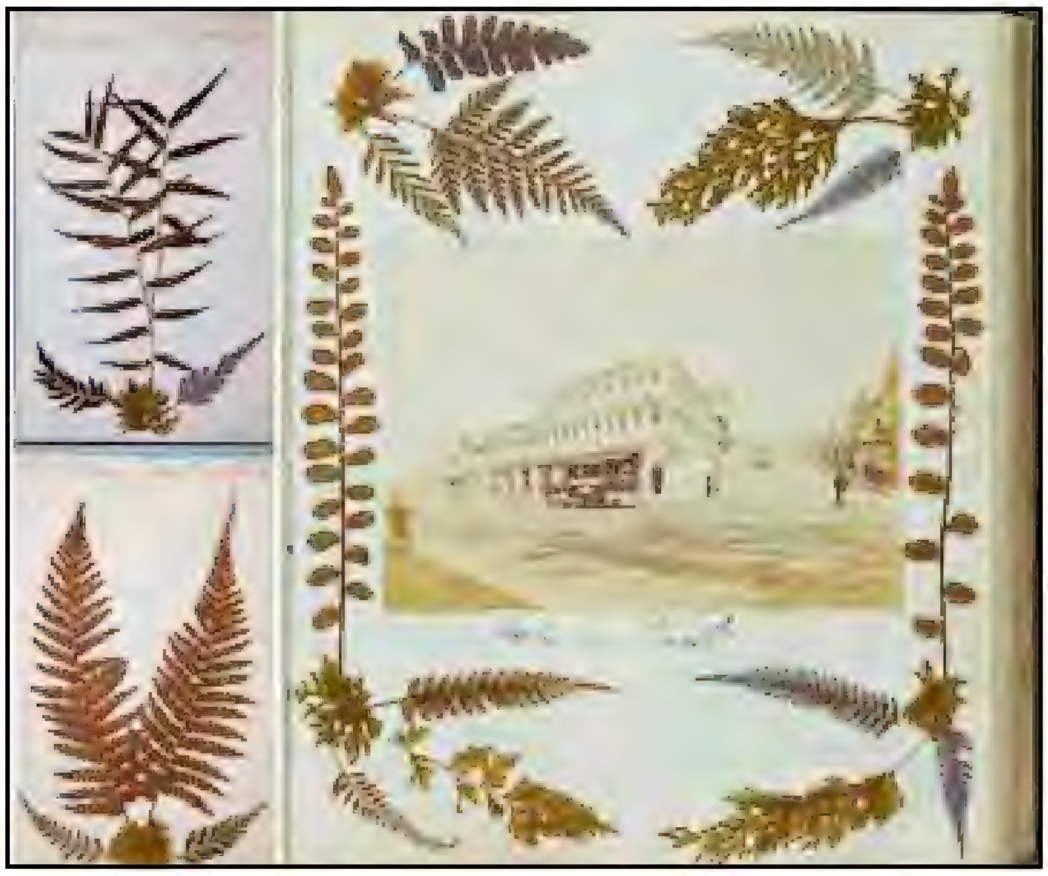

Fig 6a (top left), Fig. 6b (bottom left), Fig. 6c (right)
Mrs. C.C. Armstrong, a) b) Z fold album sheets, 15 x24.5cm c) collage 27 x 31.5cm, Princess Street Dunedin

Some early Reid Z-fold albums, particularly those in which the specimens were unlabelled and those which bore a William Reid label rather than a Miss A. Reid label, are relatively clumsy with too many overlapping ferns on each card. Panoramas with the Miss A. Reid label tend to be neater. Many Reid albums have no mounter's label. Annie eventually set up her own florist's shop in Christchurch, in partnership with her sister. She continued to produce albums and listed herself as a 'fern artist', but she never produced a label with her Christchurch address. Unlabelled Reid albums can be recognised by the quality and style of the mounting and by the handwriting of the specimen labels.

For her larger albums, Annie Reid mounted one or more fronds of the principal fern with a small clump of moss over the stipe ends, but no further decoration (Fig 7a). Where there are multiple fronds, they are always well balanced and carefully arranged. She did not create a formal frontispiece to her albums but some of her albums contain a single page (occasionally two pages) with an assemblage of fronds, mounted in a purely decorative style (Fig 7b). These pages are in striking contrast to the pureness of the other pages of the album and, when found, are very characteristic of her work.

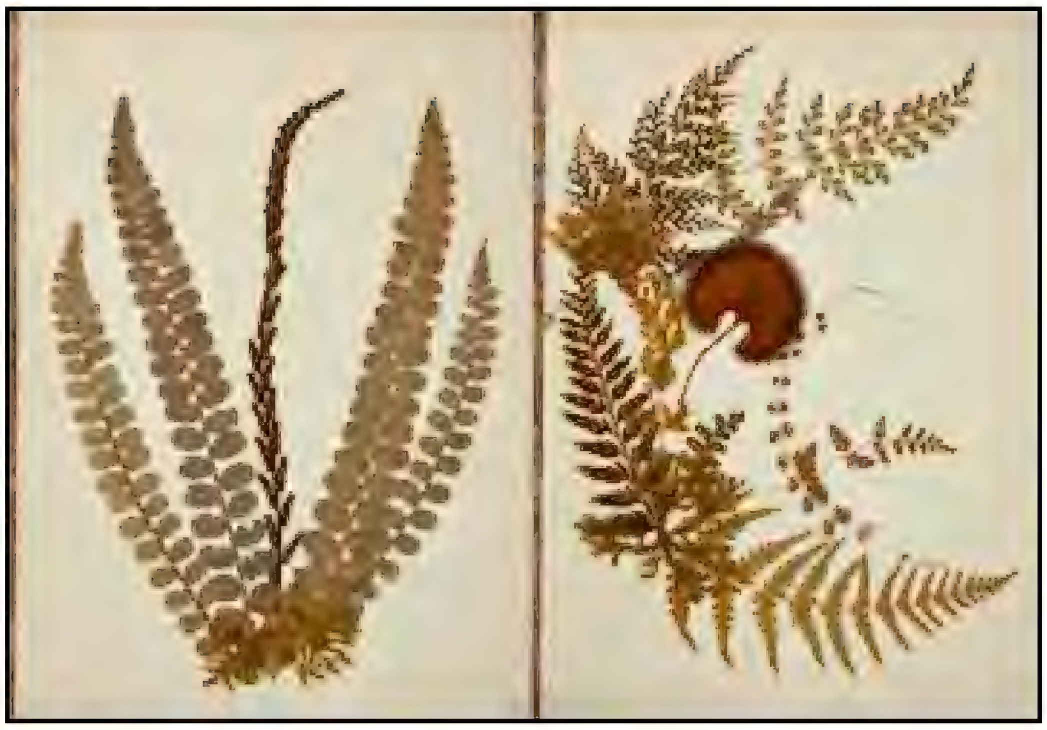

Fig 7a (left), Fig. 7b (right),
Annie Reid album 25 x 30.5cm, a) mounting style, b) decorative sheet

Fern cards and fern albums, such as those discussed in this article, are generally classified under the heading of exsiccatae to distinguish them from conventional herbarium sheets. The use of this term has varied over the years. In 1872, Ferdinand von Mueller, of the Sydney Botanic Garden, distributed around 50 sets of exsiccata to educational establishments in the colony of Victoria, intended to be used by students in conjunction with a local flora. Mueller used the term exsiccata to describe sets of mounted and labelled specimens produced for educational purposes, in contrast to the familiar 'herbarium sheets', which were mounted and appropriately labelled as reference items. Over the years the use of the term 'exsiccata' has often been expanded to include material produced for pleasure as well as for education as the two purposes often overlap and are not mutually exclusive. It is a useful heading under which to classify items that do not readily fall into other library categories.

The early New Zealand collectors who created fern

The New Zealand Fern Artists

cards and albums may well have had self-education as a motive and many were keen to find out the names of the species that they were collecting, but the additional decorative elements on so many of their sheets show that they were also regarding their accomplishments as a decorative art. The artistic skills of the collectors and the aesthetics of the decoration vary considerably, but, in general, these decorated New Zealand fern cards and albums are very attractive items. The albums produced by Eric Craig stand out as educational items as he always mounted his specimens in the order in which they were listed in the local flora. The works of Thomas Cranwell stand out for the quality of the decoration on each sheet. Molly Duggins (2016) has discussed, at length, the career of Mrs. Armstrong, supporting her as an influential regional artist.

The history of fern collecting in New Zealand is described in detail by Hayward & Rickard (2019, 53-140). Numerous examples of cards and albums are described and illustrated in this chapter. Albums with carved or inlaid wooden covers are another New Zealand speciality and these albums are much sought by collectors. The wooden album covers were chiefly made by professional artisans, but very occasional items by amateur carvers are seen.

The only example that we have seen of a set of fern cards decorated in the full New Zealand style but created outside Australasia, is a set produced in Hawai'i 1877 (Hayward & Rickard, 156-157). Hawai'i was on the British mail boat route from Auckland to San Fransisco. Phoebe Jaffrey, who produced large numbers of fern albums in Darjeeling between around 1879-85, placed a small mass of moss over the cut end of each stipe, but did not adopt the full New Zealand style (Hayward & Rickard, 159-166). Decorative albums from India, particularly those produced by military persons, usually have a symmetrical arrangement of pinnae, sometimes mounted as collages with photographs or cut out items and usually show no evidence of any attempt to identify the species.

Fern albums and cards where the specimens are mounted with decorative features are often undervalued by museum librarians and curators because they have little of no value as ‘herbarium sheets’. but the best of these items do have considerable interest for their historical value and their decorative value and the more comprehensive sets can still have considerable educational value to the general collector, as well as giving much pleasure and satisfaction.

My thanks are due to Barrie Stevenson for permission to reproduce the cards in figure 1, to Martin Rickard for many pleasant hours spent studying and discussing our combined collections and to numerous others who have shared their collections with Martin and myself.

References

Duggins, M. (2016). ‘*The World’s Fernery*’, *New Zealand fern albums and nineteenth century fern fever, in New Zealand’s Empire*, ed. K. Pickles & G. Colebourne. Manchester University Press, 102-126.

Hayward, M. & Rickard M.H. (2019). *Fern Albums and Related Material*. British Pteridological Society, Special Publication no 15.

Small is Beautiful

Adrian Dyer

We frequently comment on individual ferns that are unusually large for their species but my attention was drawn to the plant of *Asplenium trichomanes* subsp. *quadrivalens* shown in the photograph (Fig. 1) because it was so small. The longest frond was only 19mm long. Even more surprisingly, it turned out that it was not a juvenile; not only did it have mature frond morphology but, although not visible in the photograph, most fronds had some sori on the under-surface (one frond broke off while being examined and is missing from the photograph). The plant was in that sense ‘fertile’, though the viability of the spores was not tested. On another similar individual nearby, the longest frond, also bearing sori, was only 16mm long.

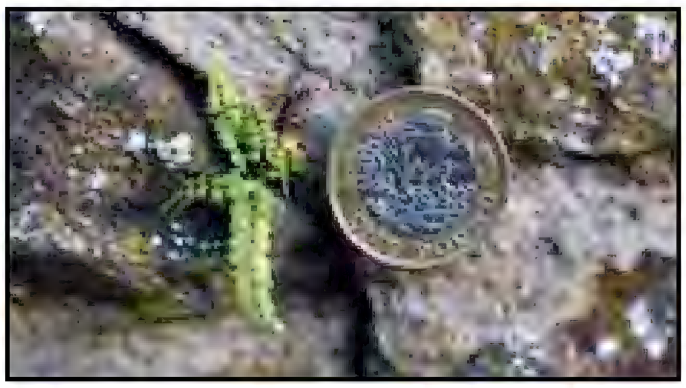

Fig. 1. *Asplenium trichomanes* subsp. *quadrivalens*

These two plants were growing in cracks in the mortar of the boundary wall surrounding the parish kirkyard in Colinton on the outskirts of Edinburgh. Considerably larger individuals of the same species were growing elsewhere on the same wall. There are two possible explanations for these two unusually small individuals. They might be genetically dwarf due to a mutation, as seen in rare instances in other species such as *Athyrium filix-femina* ‘Minutissimum’, the miniature fronds of which are only 6” long but in no way deformed. Alternatively, environmental conditions might have restricted growth without preventing the normal progression of development to reproductive maturity. It would be necessary to transplant these two individuals to optimum growing conditions to distinguish between these options, but the latter explanation is perhaps the more likely. This would make them the fern equivalent of Bonsai trees which are miniature replicas of normal mature individuals created by restricting growth. ‘Bonsai’ means ‘tray planting’ and the effect on trees is achieved in horticulture by pruning (including root pruning) and training, although a similar effect can occur in nature when seedlings establish in rock crevices and walls in exposed locations.

Because of the difference in growth habit between a fern with a single crown and a branching tree subjected to pruning, the parallel between their Bonsai versions is not exact. However, the achievement by *A. trichomanes* of reproductive maturity despite severely restricted growth is interesting as a survival strategy and also raises other questions. Has anyone seen smaller mature individuals of this species? Has anyone cultivated very small mature individuals of any fern species by restricting growth using the methods employed by Bonsai enthusiasts such as root pruning, low nutrient levels or challenging micro-habitats? I have seen plants of *A. trichomanes* beside Bonsai conifers but the ferns were not unusually small (Fig. 2).

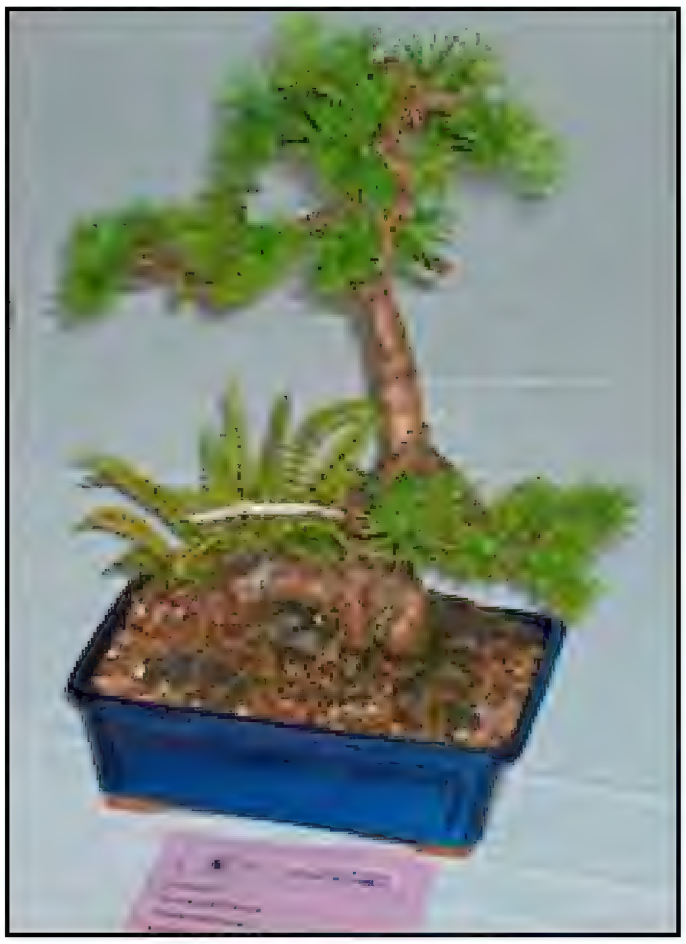

Fig. 2. Bonsai conifer with *A. trichomanes*

Excited by *Dipteris*

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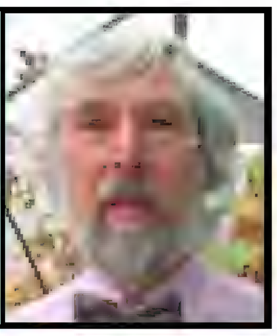
e-mail: pat.acock@btinternet.com



You know what it is like, you get a bee in your bonnet. I have always been interested in the older families of ferns and seeing pictures of Dipteris in my fern books had a yearning to see one. Joan Watson's talk and subsequent article in *The Pteridologist* 5(3): 216-224 awakened me to the fact I had never seen a live one and probably would never do so.

However, imagine my surprise when walking ahead of the party organised by Yvonne Golding and lead by Prof. Cheng on a very slippery cobbled pathway linking two villages, I saw in the dusk a metre above the path a plant that I thought for a split second was a plant I knew, only to realise it was a mass of *Dipteris chinensis* spreading along this bank for some considerable distance (Fig. 1). I still do not know whether Prof. Cheng was leading us to it as he turned off into the wood to show us *Acystopteris japonica.*

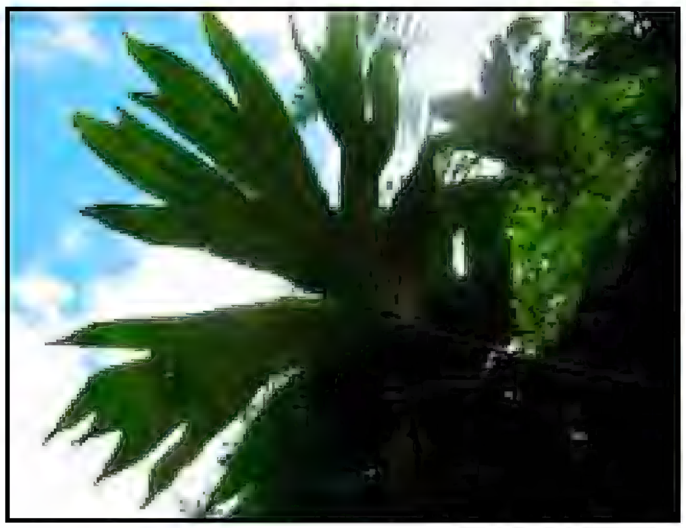


Fig. 1. *Dipteris chinensis* in China in Yunnan

Martin Rickard and I thought that Yunnan was an inordinate journey for just 12 days in the field, and so travelled on afterwards and ended up in New Caledonia. Joy of joys; on the edge of the forest in the hills, seemingly being out-competed by the grasses, we came across *Dipteris conjugata* (Fig. 2).

In 2016 Roger Golding was asked to give a talk in Taiwan and asked if anyone wanted to join him. Paul Ripley and I accepted and I contacted Prof. Wen-Liang Chiou, who kindly planned our tour. On our first day the professor gave us a tour of his wonderful Taipei Botanical Garden; it was full of ferns, which was very good preparation for our week in the field. In a pot near a pond in the garden was the very first *Dipteris conjugata* I had seen in cultivation, hearing from various people how hard it was to cultivate. Constrained to a pot it was a little short. Perhaps they feared it might run riot in the pond (Fig. 3).

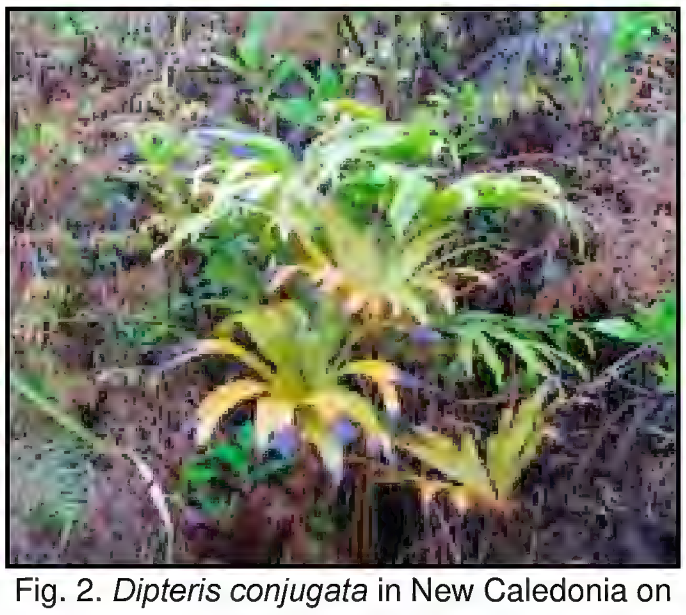


Fig. 2. *Dipteris conjugata* in New Caledonia on the forest edge

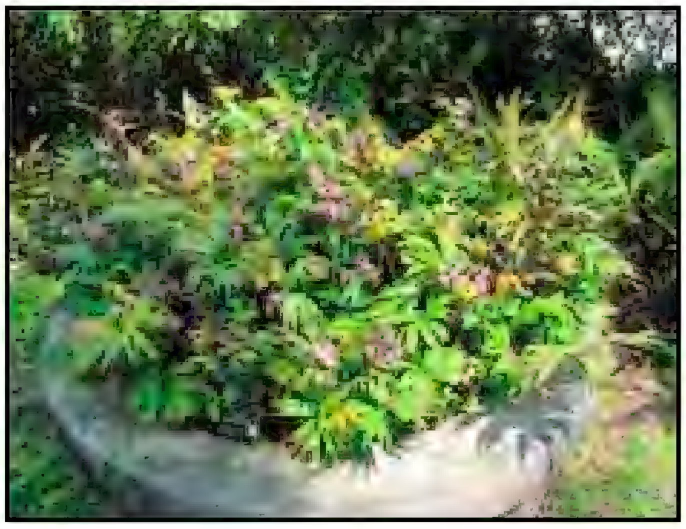


Fig. 3. *Dipteris conjugata* in a pot in the Taipei Botanic Gardens

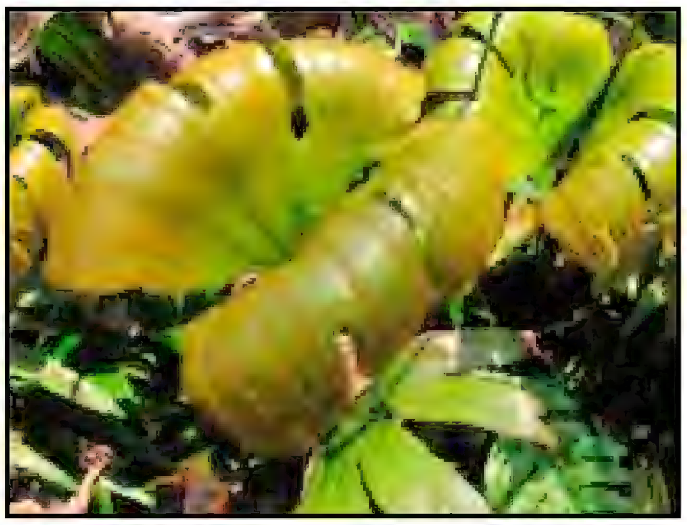


Fig. 4. *Dipteris conjugata* detail of the blade

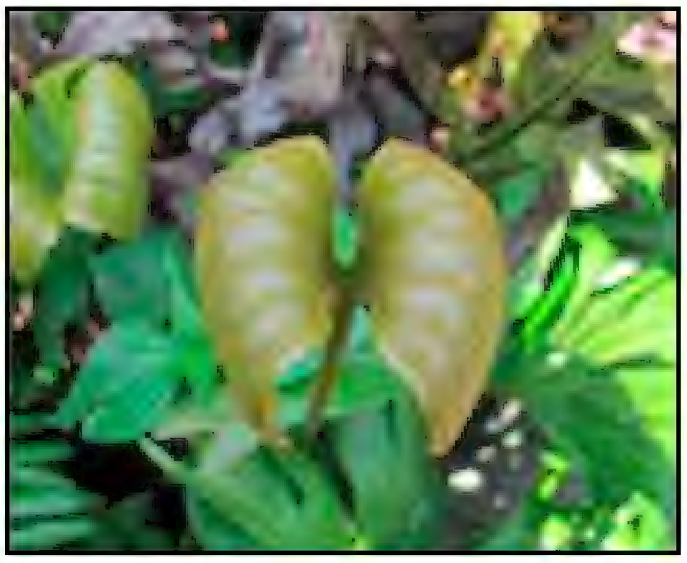


Fig. 5. *Dipteris conjugata* new frond unfurling

This year Grace and I decided to break our trip to New Zealand by calling in on Singapore for a few days. Before going I found a nice little book on the ferns of Singapore Island in the Natural History Museum Fern Library. I did not want to photocopy it and checked ABE Books; there were several for sale so I bought the cheapest. Can you imagine my surprise when it arrived and was fully leather-bound!

On our second-to-last day Grace and I went down to Labrador Cliffs close to the harbour where the book said *Dipteris conjugata* was abundant. I subsequently have found that since then it has been reported extinct. We soon ran out of cliffs but I saw a park manager talking to one of his team and asked him about it. He led me to a map close-by and showed me the location. On our way we were overtaken by Mr. Chung Yi Fei, the person in charge of the Labrador Nature Reserve, who took us to see the fern (Fig. 6). He told us about how it had been looked after over recent times and pointed out the remains of a cleared fallen tree that had nearly spoilt many years of careful monitoring. He also told us there was another colony in the army shooting range but had not seen it.

The colony was quite small but had a few fertile fronds and seemed to compete with the surrounding vegetation, most of which I can only surmise was alien to Singapore. It is to be hoped that it lasts for many more generations to enjoy, as well as turn up in other parts of Singapore.

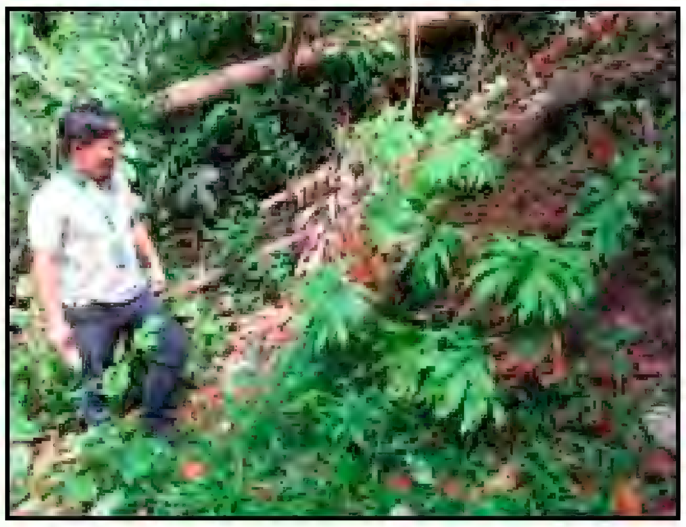


Fig. 6. Labrador Park Manager, Singapore Mr Chung Yi Fei showing Grace and I his *Dipteris conjugata*.

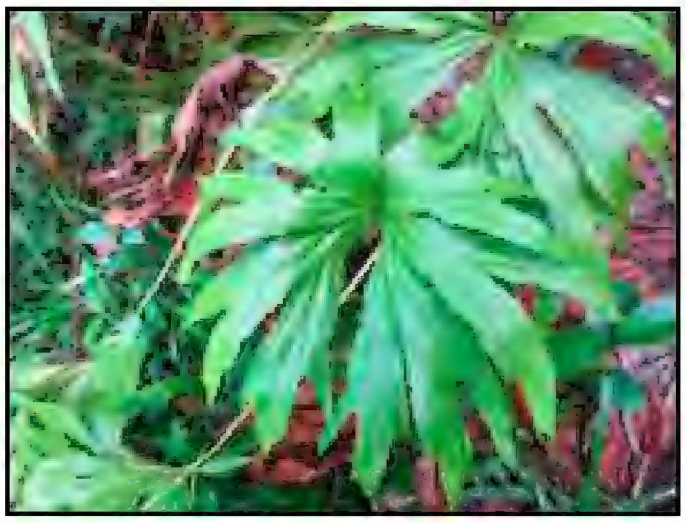


Fig. 7. *Dipteris conjugata* in Labrador Park, Singapore detail.

‘Clarissima’: An Experience with Growing from Apospory

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When, as a beginner, I started to collect ferns, I stumbled across the question - why is it that the most beautiful ferns are so rare?

In my collection of British native cultivars I came upon this question early on. It is always the best ferns that are sterile, do not produce spore or do not come true from spore or bulbils. Division of crowns seems the only way of obtaining these beauties (Fig. 1). One of these rarities I came across is the most flamboyant lady fern of all, *Athyrium filix-femina* ‘Clarissima’, in the Plumosum Group.

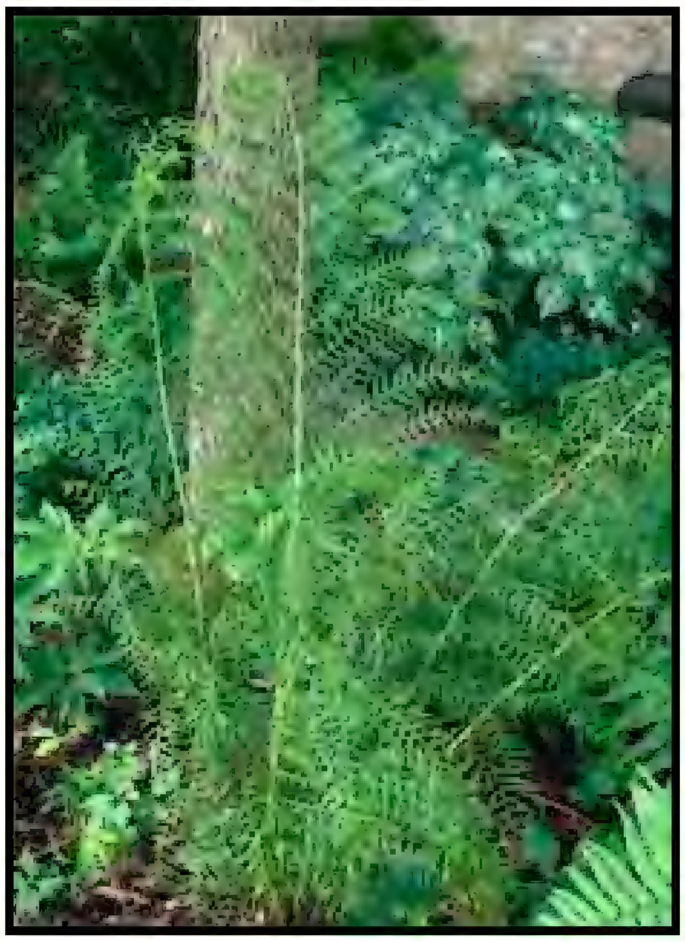

Fig. 1. *Athyrium filix-femina* ‘Clarissima Jones’

‘Clarissima’ seems to be in two forms, both of which were found in the wild. The first one was found by Mr Robert Moule in 1868 near Ilfracombe, North Devon. Captain Jones (later Colonel Jones) visited Mr Moule on the day of its discovery. Robert Moule found the plant in the morning but didn’t seem particularly interested in it, as he left it to wilt on a bench on a hot summer’s day. Fortunately it was found by Captain Jones, who rescued it, taking good care of this beauty. It was he who named it after his wife Clara, who sadly died very young. This plant is now referred to as ‘Clarissima Jones.’

In 1893 Mr T. Bolton found another form of ‘Clarissima’ in Lancashire. Mr Bolton’s form was smaller than the one found by Mr Moule in Devon. This plant is now referred to as ‘Clarissima Bolton.’

I had seen *Athyrium filix-femina* ‘Clarissima’ in one or two collections, but when talking to the owners of the gardens they told me that “it rarely makes new crowns.”

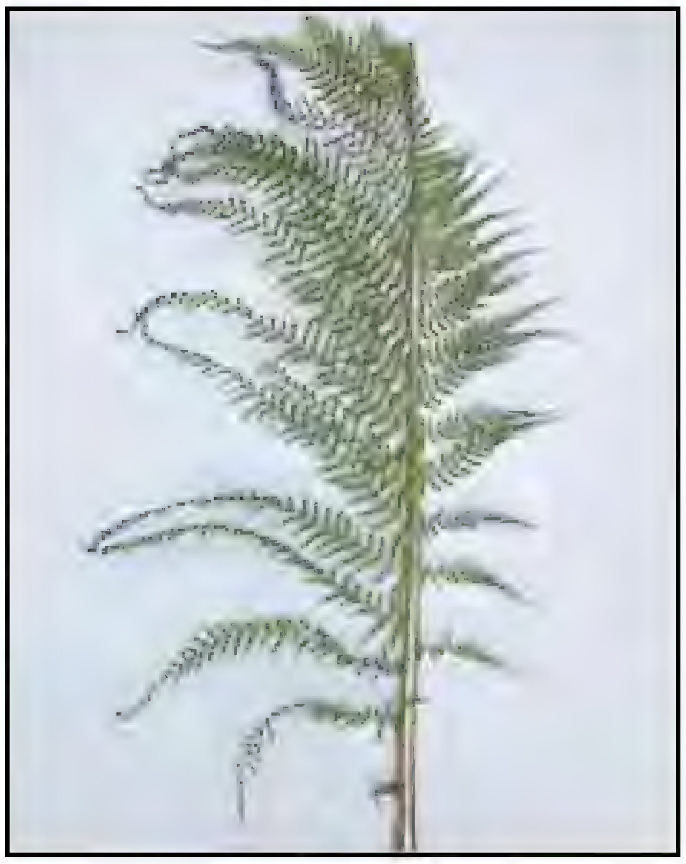

Fig. 2. Two split fronds put together to show the difference. Left ‘Clarissima Jones’ and right ‘Clarissima Bolton’

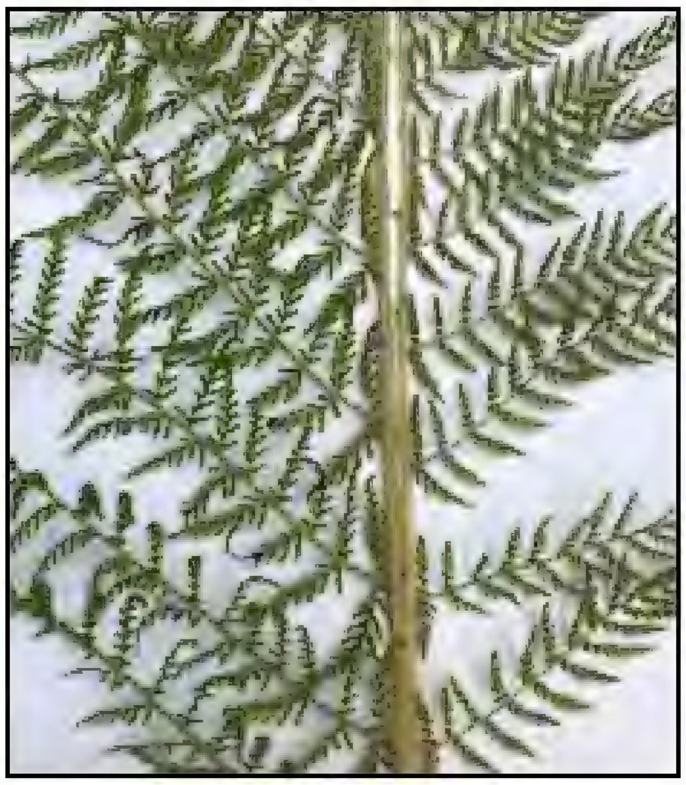

Fig. 3. Close up detail of Fig. 2

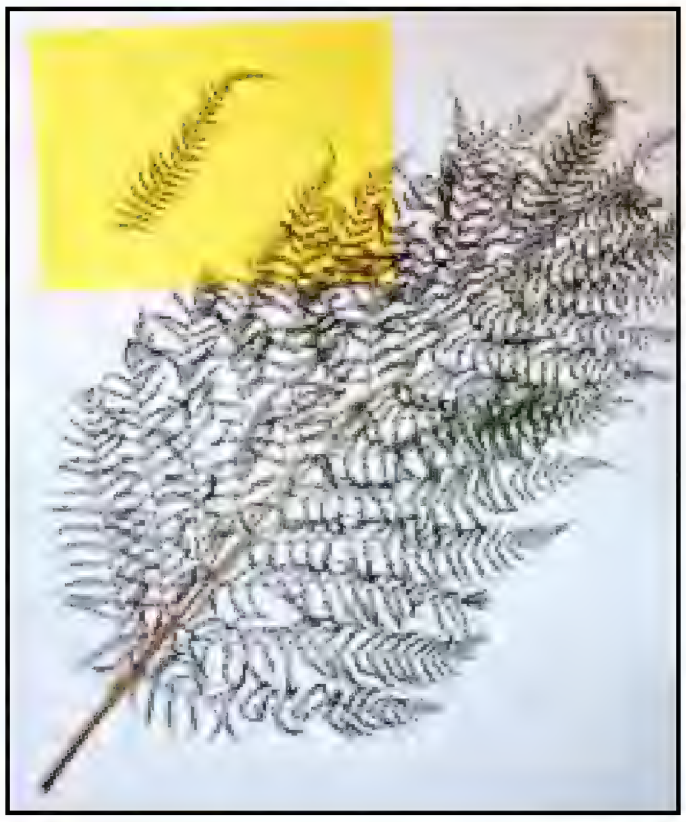

Fig. 4. ‘Clarissima Jones’ showing the length of the fronds, some up to 300mm. The yellow card is A4 to show the scale

The plant does not produce any spore at all. It was Charles Druery in 1884 who discovered that this fern reproduces in a somewhat different manner: by apospory

Reading the small amount of literature there is on this subject and talking to experienced growers, it became a challenge to me to see if I could propagate the ferns by apospory.

Martin Rickard provided me with a frond from his plant, during a planned visit to his garden, I later returned home with this precious frond. The year before I had asked Martin if he could spare a frond from his ‘Clarissima’ but I was too late, as there had already been a night-frost. According to Martin the frond must be laid down before the first frosts as this affects the ability of the frond to produce prothalli.

Once the frond has been collected it is “bathed” in rainwater to get rid of any spore from other ferns that may be attached, so we know that the prothalli which develop are from ‘Clarissima’ and not from rogue spores. The fern fronds are put in a heated greenhouse and given the same conditions all through the winter. They are placed on heated benches and kept at about 18°C.

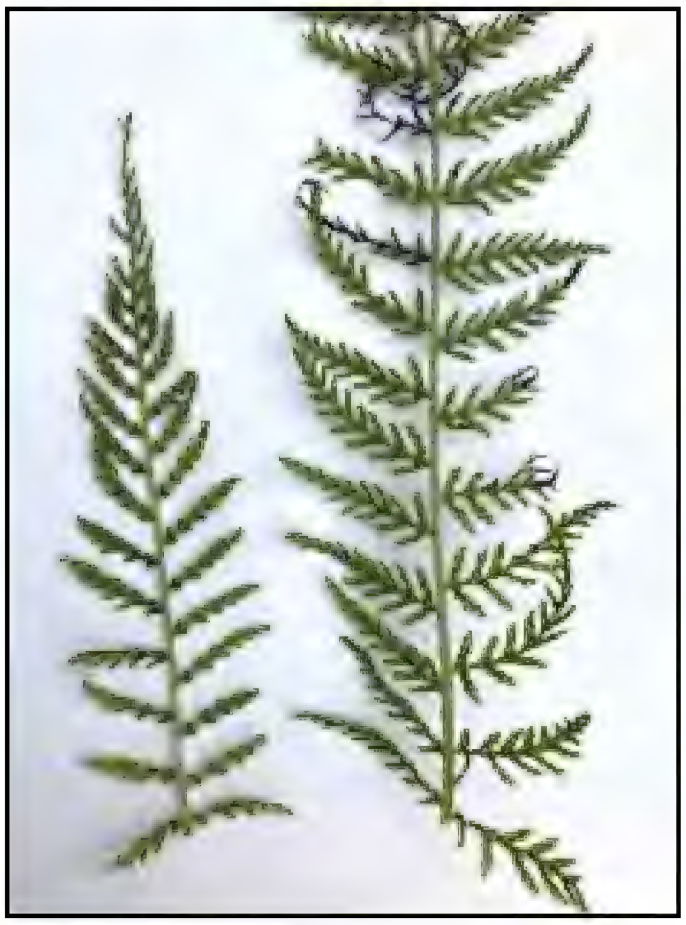

Fig. 5. Left: ‘Clarissima Bolton,’ right: Clarissima Jones.’ The black spots are the start of apospory where spore cases would normally be

‘Clarissima’: An Experience with Growing from Apospory

The first thing I needed to learn was how the frond should be laid down to get the best results; should the frond be placed on the compost facing up or facing down? I took the pinnae off the rachis and put them in two trays, one tray with the pinnae facing up and the other tray with them facing down. A glass sheet was cut to size, disinfected and placed on top of the compost to make sure the pinnae kept in contact with the compost. The glass would also make sure the humidity in the compost would keep the pinnae from drying out and would help with the growth of the prothalli, and ultimately with fertilisation. It turned out that the best way is for the underside of the frond facing up (Fig. 6.).

The compost I use to grow the ferns is a general purpose potting compost that I have used for many years, and I know how quickly it dries out. The compost is sterilised in the same way as with preparing soil for spore sowing.

The pinnae from the frond are placed on the compost at the end of September. By January the prothalli have started to grow but, as the prothalli expand, the pinnae begin to fade and lose their colour (Fig. 7.). It seems that Druery’s apospory develops into something quite remarkable, particularly as the prothalli begin to expand. By mid February the prothalli have grown significantly and are beginning to touch each other (Fig. 8.).

By the end of March the little fronds are starting to develop (Fig. 9.) and I place small stones on the seed tray on which to rest the glass sheets. This gives the delicate fronds a higher humidity and therefore stops sudden drying out of the compost, as the temperature can rise quite rapidly in the greenhouse at this time of year. By raising the glass sheet gradually I allow more air to circulate around the young ferns and slowly get them used to the real world of less humid conditions, although I do this as gently as possible so that the young ferns experience as little stress as possible.

I have repeated these same techniques for the last three years and I have roughly the same results each year. I have been unable to test my methods with the much rarer ‘Clarissima Bolton’ as fronds from this cultivar are almost impossible to get hold of, but I hope to be able to rectify this in time. My results with ‘Clarissima Jones’ are very pleasing, and I have managed to produce numerous young ferns. I have given many of these aposporously produced offspring to friends and the rest have gone to the better-known fern nurseries. They have grown these young ferns on very successfully and have many happy customers who have these extraordinarily beautiful lady ferns growing in their gardens.

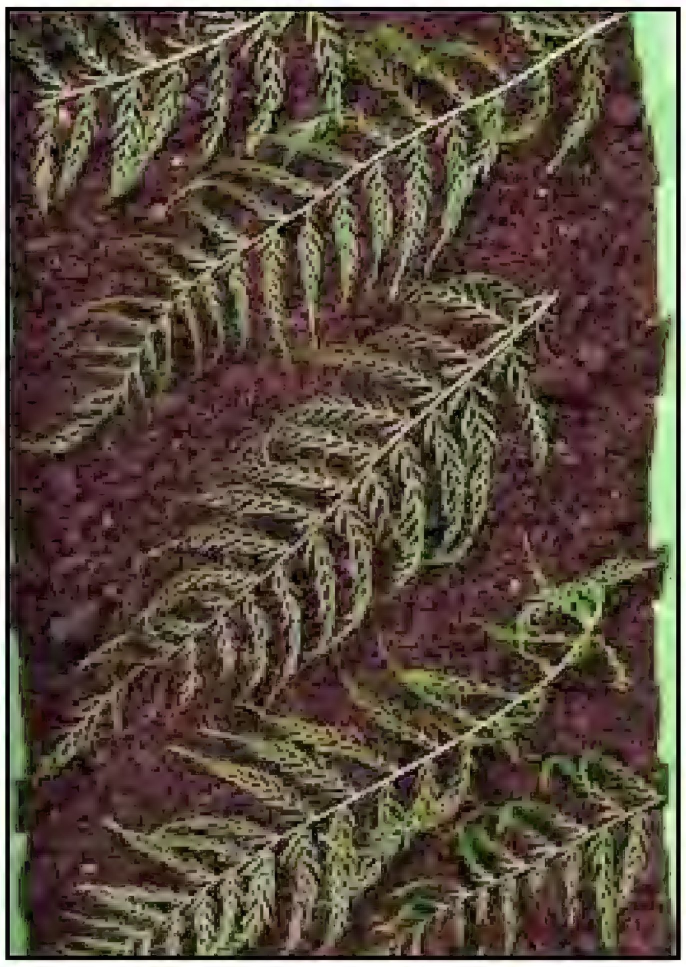

Fig. 6. Fronds laid on compost with the underside facing up

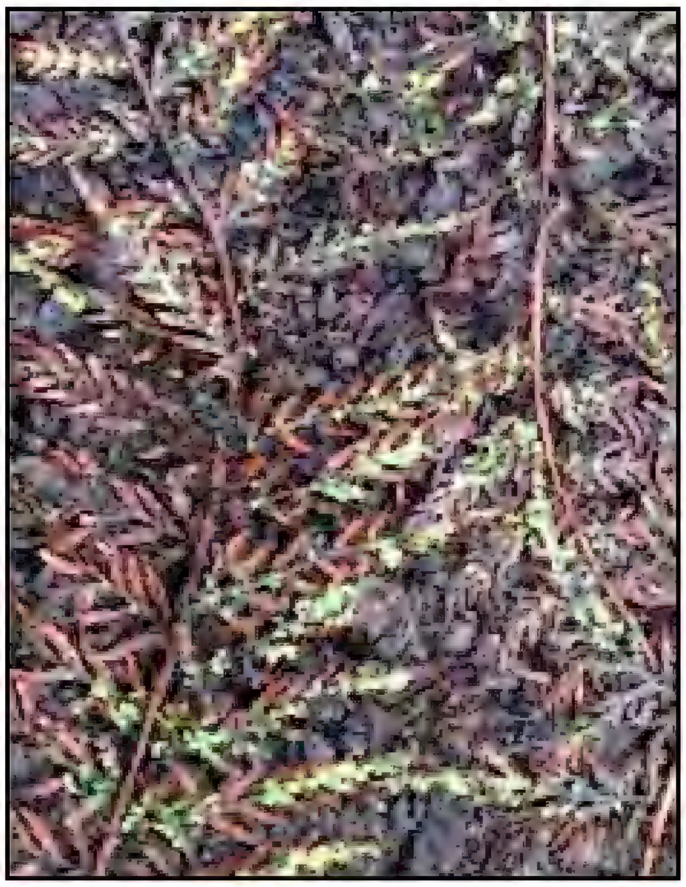

Fig. 7. The prothalli are beginning to expand

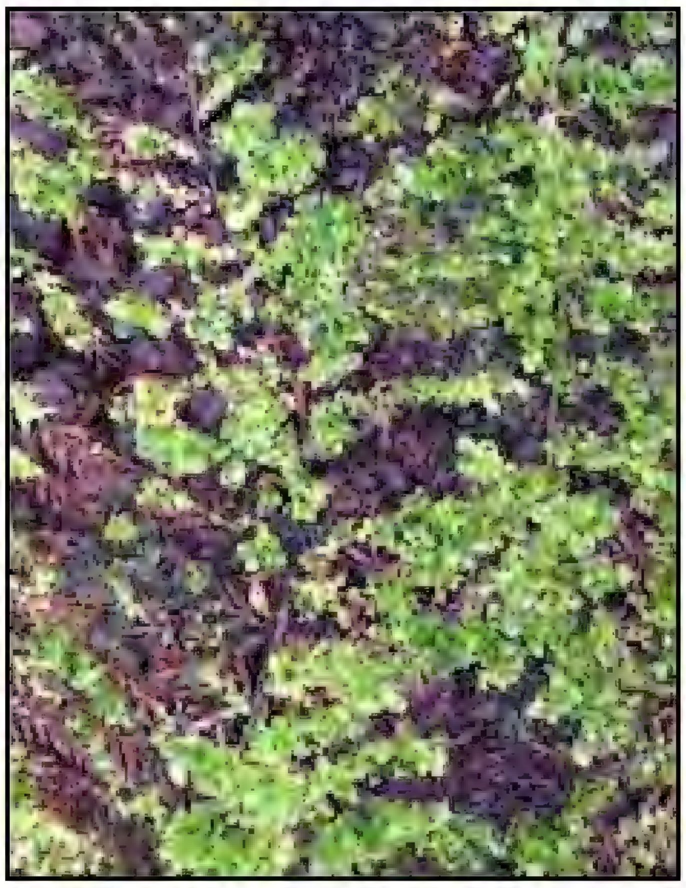

Fig. 8. The prothalli are starting to touch each other

It is written in the old literature that ‘Clarissima Jones’ produces near identical offspring; however, the offspring of ‘Clarissima Bolton’ is said to be more depauperate, I have not grown enough of Bolton’s form to be able to confirm this.

According to the literature there are more ferns e.g. some cultivars of *Asplenium scolopendrium*, that can be propagated by apospory and produce prothalli from the undersides of their fronds. These ferns are again extremely rare and although I now have a plant of a cultivar which is said to be able to reproduce aposporously, my plant is too young to do this at the moment.

I hope this article will help encourage the growing of more rare fern cultivars by putting my experiences on paper. Just have a go, there is nothing to lose!

1. Apospory is the production of gametophytes directly from diploid cells of the sporophyte, without spore formation, in certain ferns. - ed

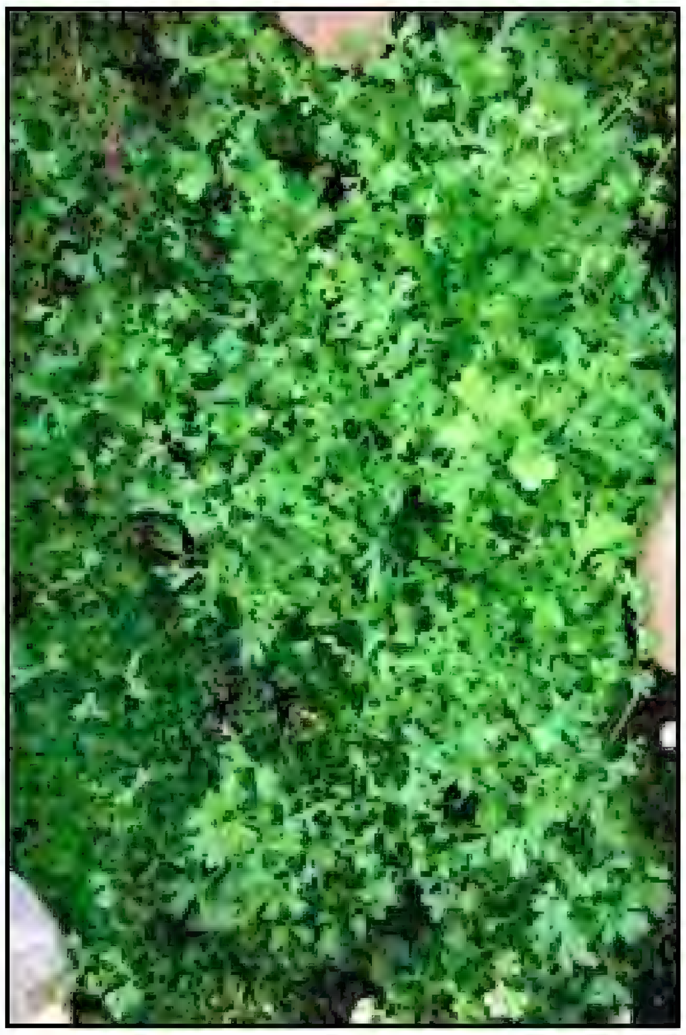

Fig. 9. Sporelings developing

George Whitwell and the British Pteridological Society

Richard Wrigley

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On 23 September 1891, ten people attended the inaugural meeting of the Northern British Pteridological Society held in Kendal at premises provided by Joseph Wiper (inventor of Kendal Mint Cake). George Whitwell was a founder member and at the meeting was elected Secretary to the Society. The following year the membership increased rapidly with members joining from many parts of the UK and at the first AGM in 1892 'Northern' was dropped from the title and the British Pteridological Society (BPS) was formed.

Whitwell developed an interest in Lakeland ferns and he created his fern garden at Serpentine Cottage where he cultivated his fern collection. He was an active BPS member and corresponded with fellow members describing and exchanging fern specimens (BPS archive). The photograph in Fig. 1. shows Whitwell sitting in his garden discussing ferns with two BPS members, P Neil Frazer (Edinburgh) on his left and W Phillips (Belfast) on his right.

Whitwell was clearly a knowledgeable, self taught man and an active fern hunter and collector of Lake District ferns. He used his extensive knowledge to edit the Third Edition of '*The Ferns of the English Lake Country*' by W J Linton, adding significantly to the list of varieties (Fig. 2.).

The 19th annual meeting of the BPS was held on August bank holiday 1909 at 'The Institute' in Bowness. Whitwell attended and he presented a paper (Fig. 3.) 'My own finds of British Varieties in the Lake District' (BFG, v 1, 2, Dec 1909). Reference is made in the Gazette to his forty-year fern hunting career and his extensive knowledge is evident from his detailed and informative descriptions.

F W Stansfield noted in 1924 that of the 61 finds listed 26 were montanas and his montana congesta was considered unique, however, his most remarkable find of all was his *Blechnum* sp. *paradoxum*, This fern was absolutely unique, not only among Blechnums, but among ferns, nothing else like it had been found in any species. It was a cause of great grief to the finder and to other fern-lovers when this curiosity eventually became extinct.

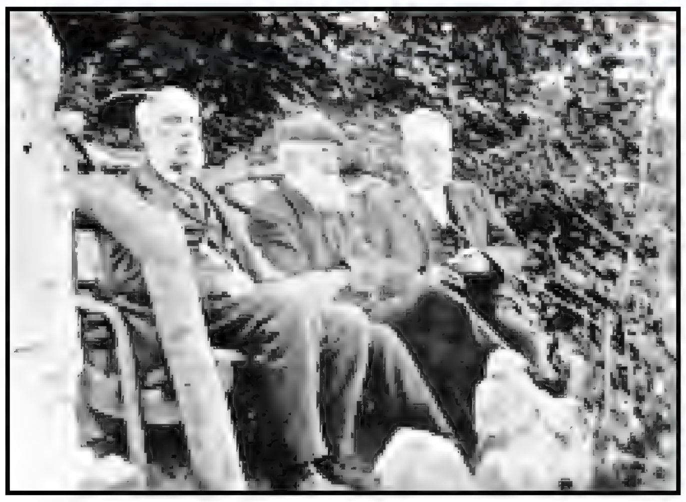
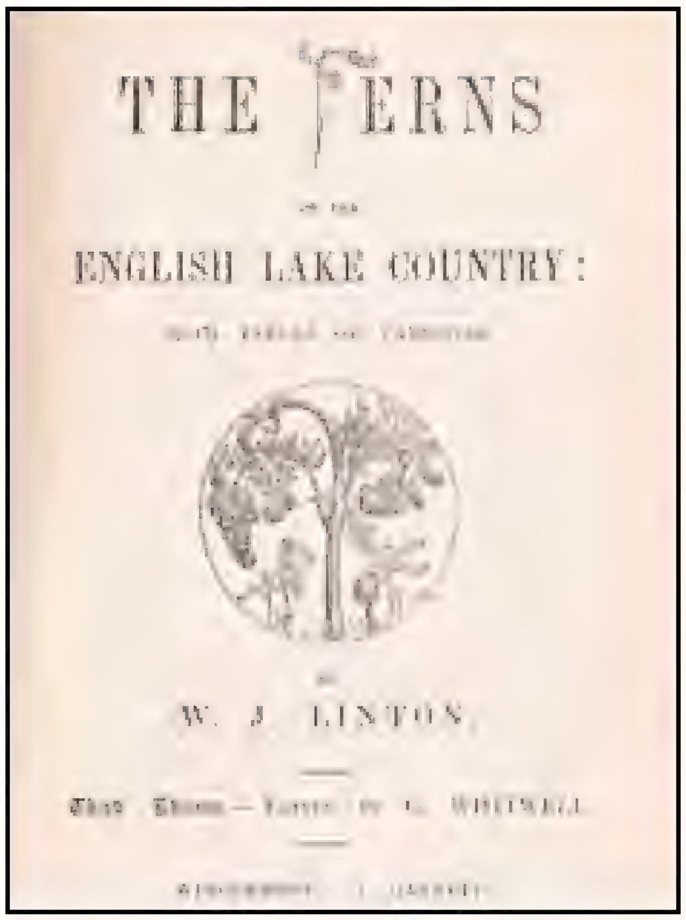


Fig. 1. Whitwell (centre) in his garden at Serpentine Cottage
Courtesy of BPS Archive

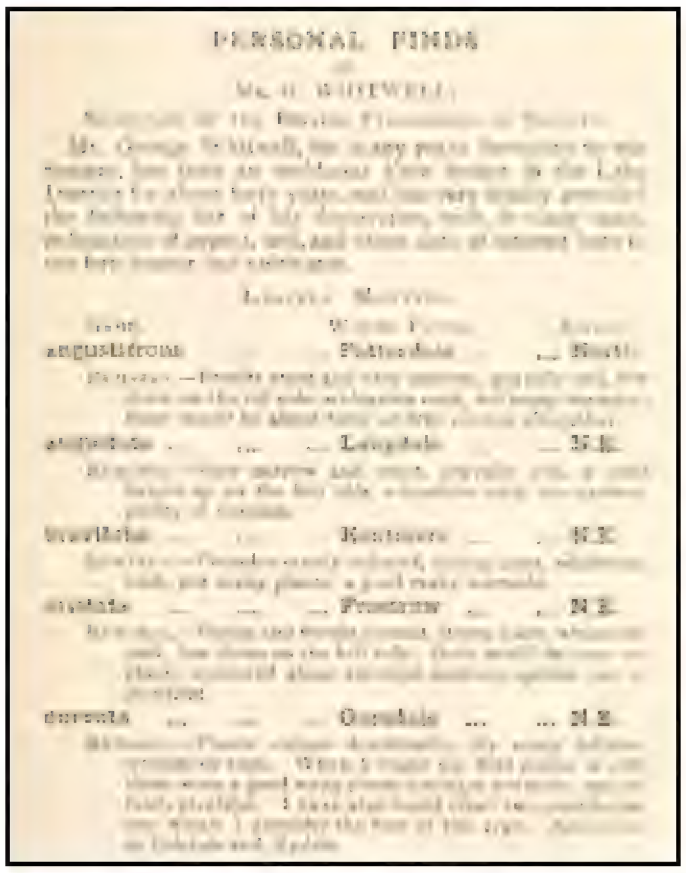


THE FERNS

ENGLISH LAKE COUNTRY:

W. J. LINTON.

Fig. 2. Frontpiece of '*The Ferns of the English Lake Country*' showing Whitwell as the editor



PERSONAL FINDS

Fig. 3. Whitwell's Personal Finds Extract from *British Fern Gazette* v 1, 2, Dec 1909

At the 19th AGM Whitwell attended a field trip in an old quarry that formed part of the grounds of the hotel, possibly The Belsfield (Fig. 4.). In the photograph Whitwell is seated in the middle row on the far left.

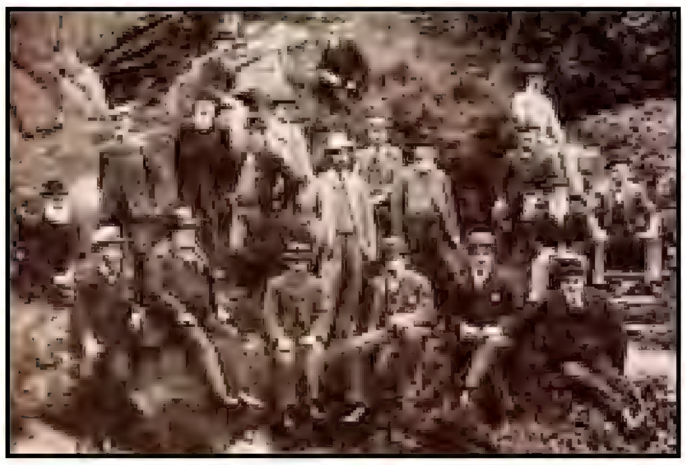


Fig. 4. BPS Field Trip, Bowness, 1909
Courtesy of BPS Archive

The first edition of The British Fern Gazette, published by the BPS in 1909, resulted in a further growth in the Society's membership and to reflect this the committee agreed that the following year the AGM would be held in Moffat on August Bank Holiday. For the first time Whitwell did not attend the AGM but submitted his letter of resignation to be read in his absence. In *British Fern Gazette*, v1, 5, September 1910, the Editor noted:

> "…the regretted resignation of both Mr G. Whitwell of Kendal, the Hon Secretary there since the inception of the Society and Mr W. Wilson, the Treasurer also of Kendal, whose engagements prevented him from undertaking the increased work involved in the now rapid development of the society."

Reasons for Whitwell's non-attendance at the AGM, the first to be held outside the Kendal area, are not recorded nor are the reasons for his resignation. The growth in Society membership and the increased workload with the introduction of the *Gazette* may have contributed to Whitwell's resignation.

Whitwell had played an active role in the BPS and at an earlier meeting on 6 June 1892 a proposal had been made:

George Whitwell and the British Pteridological Society

> "That a Herbarium of all known British Ferns be kept by the Society for the purpose of example and these shall be passed by the Committee as being the standard and recognised types of such species or varieties & that Members be requested to forward fronds for the formation of such Herbarium and that be kept by the Secretary of the Society (Whitwell)."

There were no specific minuted references to the herbarium for the next 18 years, however, it can be assumed that the herbarium was a going concern because submitted varieties were discussed and named at Society meetings and Whitwell corresponded with various BPS members (*BPS Archive*).

The next reference to the herbarium appeared in the minutes of the 19th Annual Meeting of the BPS (1 August 1910). Although Whitwell had tendered his resignation both as Secretary and member of the Society, it was proposed and agreed that Whitwell be made an honorary member of the Society and he was also requested to continue as keeper of the Society's herbarium. Whitwell was present at that meeting and had accepted the request to continue as keeper of the herbarium, because at the Annual Meeting two years later on 5 August 1912,

> "It was resolved that a permanent record be kept of typical varieties of British Ferns found, raised or grown by the members & which they are requested to send for this purpose to the Annual Meeting in good condition for judging and preservation and that the committee shall determine such forms as shall be handed to Mr. G. Whitwell for preservation in the Society's Herbarium."

There were no minuted references to the herbarium for forty-seven years and it is unlikely that any of this early collection has survived within the current BPS/RHS herbarium.

Little is known of Whitwell's education or how his interest in ferns began, however, his interests and achievements are described in a BPS publication (Hall, 1991):

> "G. Whitwell (Secretary 1891 - 1909)
> One of the founders of the Society, George Whitwell (1839 - 1924) served as secretary for 18 years.
> Unlike many other members of the society who were 'gentlemen' or 'professional men,' he was an ordinary working man with little pretention to education. He was, as Stansfield wrote of him, ' a gentleman of the first quality - truthful, honourable and kindly.'
> Whitwell's forte was the ferns of the Lake District, of which he was a prodigious hunter and grower."

Whitwell corresponded regularly on fern related matters with F W Stansfield M. D., the *British Fern Gazette* editor, and a selection of his letters are contained in the BPS archive. F W Stansfield wrote Whitwell's obituary published in the British Fern Gazette in 1924 and provided the most detailed description of George Whitwell:

> "It is with deepest regret that we record the death, on June 17th of our old member and friend, Mr George Whitwell of Kendal, in his 85th year, one of the founders of the Society and for many years its esteemed Hon. Secretary. Although in humble circumstances and with no pretensions to culture or literary attainments, he was, in all essential respects, a gentleman of the first quality-truthful, honourable and kindly. He had a keen sense of humour and a large fund of anecdotes of the countryside and its inhabitants. An all-round naturalist of no mean character, he was a keen botanist, but his greatest love was for British ferns and their variations. Of these, he possessed an extensive and choice collection, largely consisting of original finds, especially of those of the Lake District. Of these last, he had probably a more intimate knowledge than any other man up to the time of his death. He never condescended to make a trade of his hobby, but was content with the pleasure of tending and developing his pet plants and of giving duplicates to his friends. It was his greatest pleasure to give a spare plant of a good thing to anyone who could appreciate it and, as a natural consequence, anyone who had anything good in the fern line was always glad to " give a bit to Whitwell." The writer has received many valuable ferns from him, but always as free gifts; never as the result of any kind of bargain and certainly never for any consideration of "filthy lucre." As he was a constant hunter and a resident in a ferny district his finds were numerous and often very good. His own record of these, published in *The Gazette* of December, 1909, contains 61 varieties, 26 of which were montanas. His best montanas were probably his augustifrons, congesta and plumosa, all very fine things, but, while augustifrons and plumosa have been closely paralleled by others, his congesta remains unique, being by far the most vigorous and dense, as well as the largest grower, of this section. His most remarkable find of all, however, was his *Blechnum* sp. *paradoxum*, the history of which is related in *The Gazette*, Vol. III., page 263, as well as in Mr. Whitwell's own record, as above stated. This fern was absolutely unique, not only among Blechnums, but among ferns, nothing else like it having been found in any species. It was a cause of great grief to the finder and to other fern-lovers when this curiosity eventually became extinct. We are glad to learn that our past President, Mr. Alexander Cowan, has arranged to purchase a large proportion of Mr. Whitwell's collection, including the Blechnums, the Lastrea montana varieties and the Polypodies, as this will ensure the valuable series of original finds in these species being still available for reference and comparison in the hands of an eminent and influential member of the Society. Mr. Whitwell's death has caused a great gap in the Society as there are now very few remaining of the band of Lake District fern growers who formed the nucleus of the Society. Those who knew him will always remember his quiet and unassuming manner and his quaint and interesting personality. It is well for us to have known such a man. Our sympathy goes out to the daughter who is the only surviving member of his immediate family.
>
> F.W.S."

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Sea Spleenwort in Unexpected Places: Humber and Tweed

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I don't know why it is but my heart leaps whenever I see the beautiful *Asplenium marinum* growing on coastal rocks. Maybe it's the sea air, or its association with being on holiday or on a BPS excursion to the Scottish Isles with ferny friends. But, as I've discovered recently, this fern is not particularly associated with the sea! What is important for sea spleenwort is the right kind of rock face fissures, which are frost-free with humid air, but it seems it doesn't necessarily need sea-water spray. If you look at the BSBI distribution map you will see that this marine fern is mostly confined to the west and south west Atlantic coasts of Britain and Ireland, which are influenced by the gulf stream. It does occur on the east coast but it is nowhere near as prolific; its distribution in the east is mostly confined to NE Northumberland and Scottish coasts; but if you look at the distribution map you will see there is an isolated bright red blob in Hull! At this point I should really say Kingston upon Hull – there's lots of history: people have been living here since Neolithic times, first mentioned as a town in 1193; an early hub of the English Civil War; home of William Wilberforce and the abolition of slavery; it survived the 'Hull Blitz' in WWII and not forgetting that the city is unique in the UK, not only for having a thriving colony of sea spleenwort but also in having had a municipally-owned telephone system from 1902, sporting cream, not red, telephone boxes! Kingston upon Hull is on the confluence of the river Hull and the Humber estuary. The Humber is a large tidal estuary formed by the confluence of the tidal rivers Ouse and Trent. The estuary is navigable for the largest of deep-sea vessels. The waters are generally very well-mixed with salinity varying by less than 5 per cent with depth. Hull is actually 25 miles inland from the North Sea.

Fig. 1. Kingston upon Hull

I was told about this unexpected site shortly after I arrived in East Yorkshire by the VC recorder Richard Middleton, who had discovered 3 colonies of sea spleenwort back in 2004 growing on a south-facing quayside wall in the city of Hull. When I first went to look at it around 5 years ago we counted 12 sizeable clumps. In 2018 a few of us fern fanatics did another count; in the first colony we counted 24 plants, 11 of which were established and the rest small regeneration. The second colony there were around 14 clumps plus 4 tiny plants. The third colony there were 25 plants of which 9 were small regeneration. So it's spreading! We searched around the whole marina, finding the usual wall ferns – *Asplenium scolopendrium; A. trichomanes; A. ruta-muraria* and *A. adiantum nigrum* - but we only found one other *A. marinum,* growing quite close to our wall near the harbour master's office. Richard has made sure that the harbour office knows about this important colony.

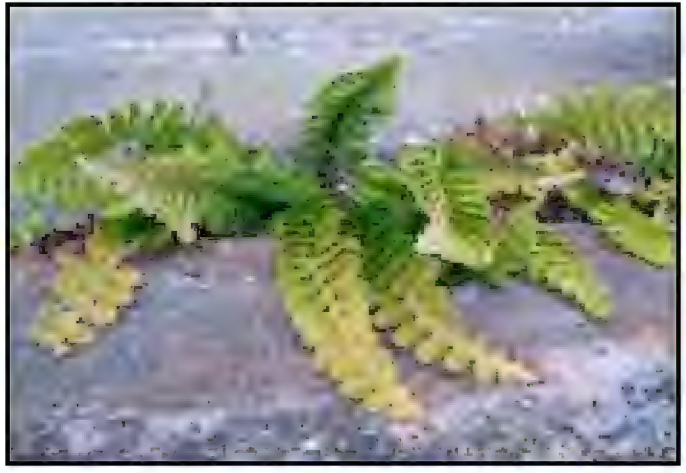

Fig. 2. *Asplenium marinum* growing at Kingston upon Hull

Moving further north into the eastern Scottish Borders and Berwickshire you can find the odd isolated colony of sea spleenwort growing in fissures on the sandstone coastal rocks, but these are well spaced out. Paul Sharp sent me a copy of '*A botanical tour of Berwickshire'* by the VC recorder Michael Brathwaite. It makes interesting reading as he usually includes ferns and I got very excited when I read about an isolated colony of sea spleenwort recorded inland along the Tweed. So we set off along the Tweed path near to the village of Ladykirk – a bit more history needed here; Ladykirk was originally called Upsettlington but King James IV of Scotland seemed to like the place and established his headquarters here and renamed the town *Ladykirk*; the very unusual church that he built is known as Kirk of Steill. Ladykirk stands directly opposite Norham Castle, which was under siege for a while by the English but it all got resolved in the end. Back to ferning .

At first I didn't feel very confident about finding this fern; it was a pleasant walk, just open fields along the river bank, but then on rounding a vast bend in the river we came across a sandstone outcrop of rock that looked similar to that on the coast. Near this outcrop was a welcome bench with a warm south-facing view where we sat with our snacks. The outcrop might have been covered in ivy but it had clearly been cut back and out of the corner of my eye there it was; a beautiful crop of *Asplenium marinum* looking very green and lush, happy in the sun, several plants growing in the warm sheltered rock crevices around 12 miles inland from the sea! Apparently salt water only backs up around half a mile or so in the Tweed estuary at Berwick, so no sea spray just a nice warm sheltered rock face with presumably a moist environment. Lovely but how did it get there?

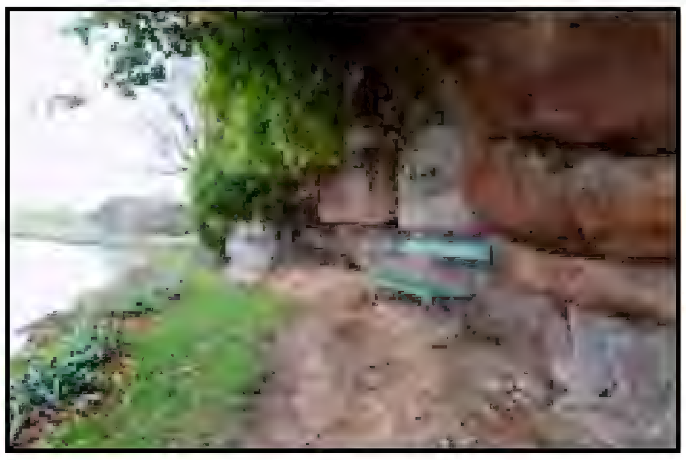

Fig. 3. The site by the Tweed

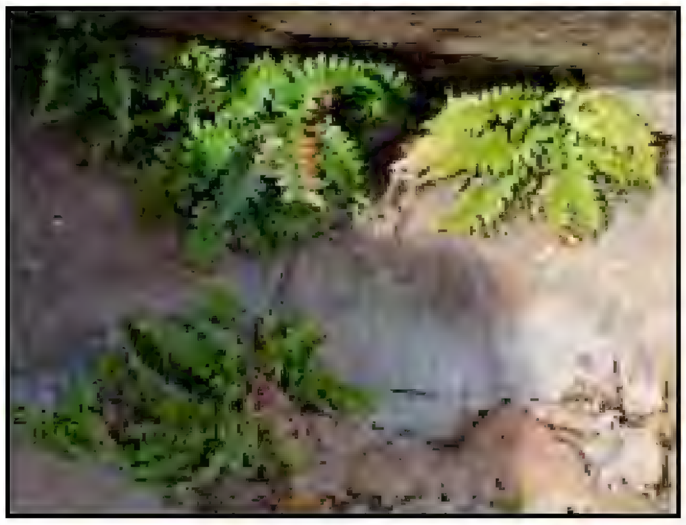

Fig. 4. A crop of *Asplenium marinum* by the river Tweed

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Middleton, R. (2005). *Ferns in Kingston upon Hull*,

Matteuccia orientalis – a Very Hardy Fern

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Most fern growers you speak to have tales of the effects of the "Beast from the East" on their gardens last year. Often they report that some ferns just got "knocked back" but recovered, while other ferns were lost forever. This short article describes an unexpected observation I had in our garden. We live on the East Anglian coast, and usually it's the summer lack of rainfall or winter biting easterly winds we have to contend with.

Matteuccia orientalis (and throughout this article I'm sticking with the "old" names) originates from the East as its name reflects, and is occasionally for sale in nurseries and garden centres. It has RHS's Award of Garden Merit and a hardiness rating of H4 (average winter, -10° to -5°C). I got mine about 15 years ago and grow it in my "bog garden," a north facing area fed by rainwater run-off from our bungalow roof. Usually it is overgrown by the more vigorous *Blechnum chilense* and *Onoclea sensibilis* around it. In late February 2018, the "Beast" brought snow (Fig.1.) and prolonged low temperatures (down to -13°C on my temperature gauge). In mid-April, I cleared away the previous year's dead fronds from the area (Fig. 2.), and was surprised to see in the following weeks the *Matteuccia* forging ahead while the ferns around it lay dormant (Figs. 3. and 4.). The *Blechnum* and the *Onoclea* did eventually catch up and overgrow the *Matteuccia* as usual, but, for a while, the *Matteuccia* was the star of the bed.

If you have other observations about fern hardiness, please do add them to the BPS Hardiness Database when it appears on the BPS website.

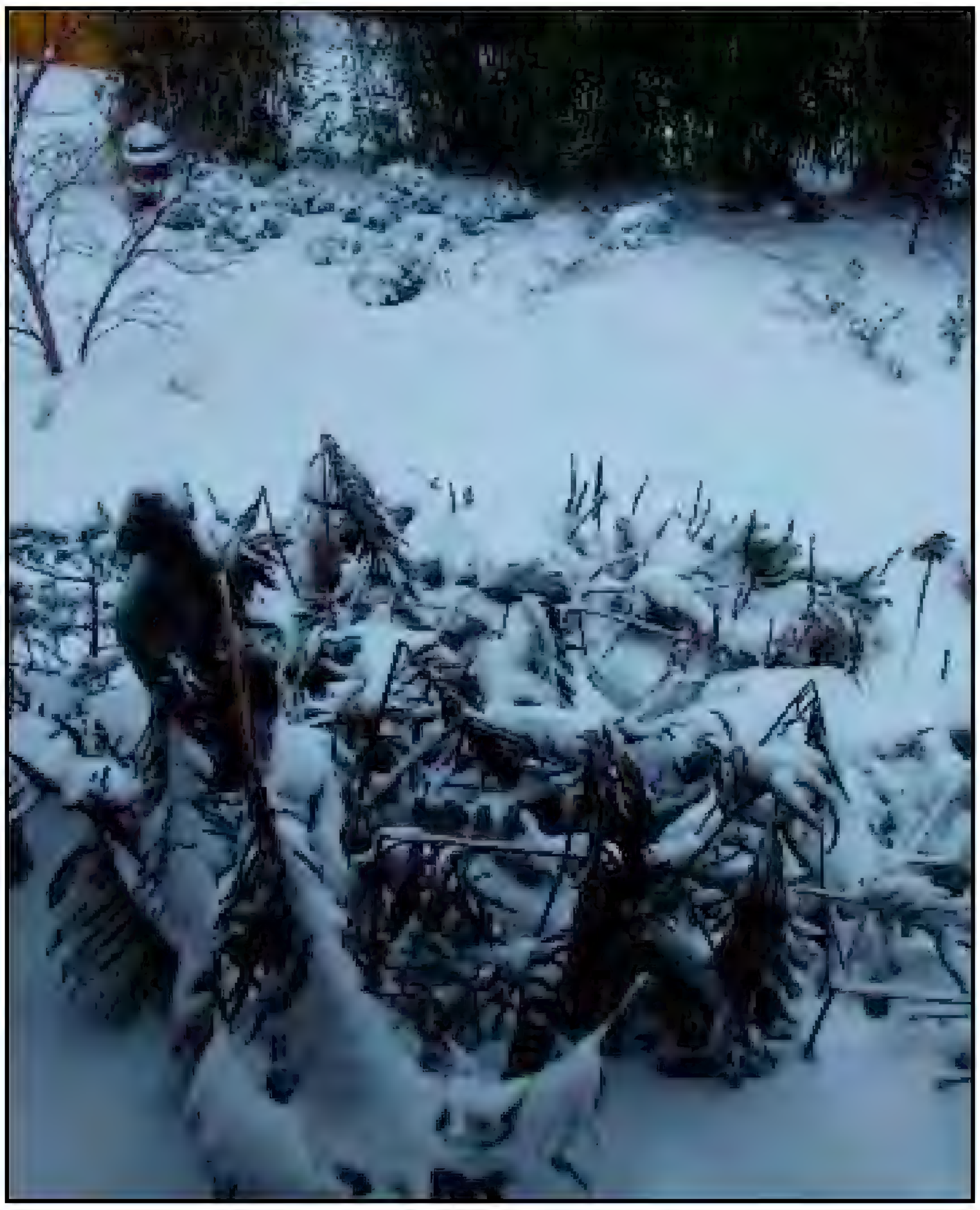

Fig. 1. Late February 2018. The "Beast from the East" manged to cover my *Matteuccia orientallis* with snow and the temperatures dropped down to -13°C

Fig. 2. Mid-April 2018. The dead fronds have been cleared

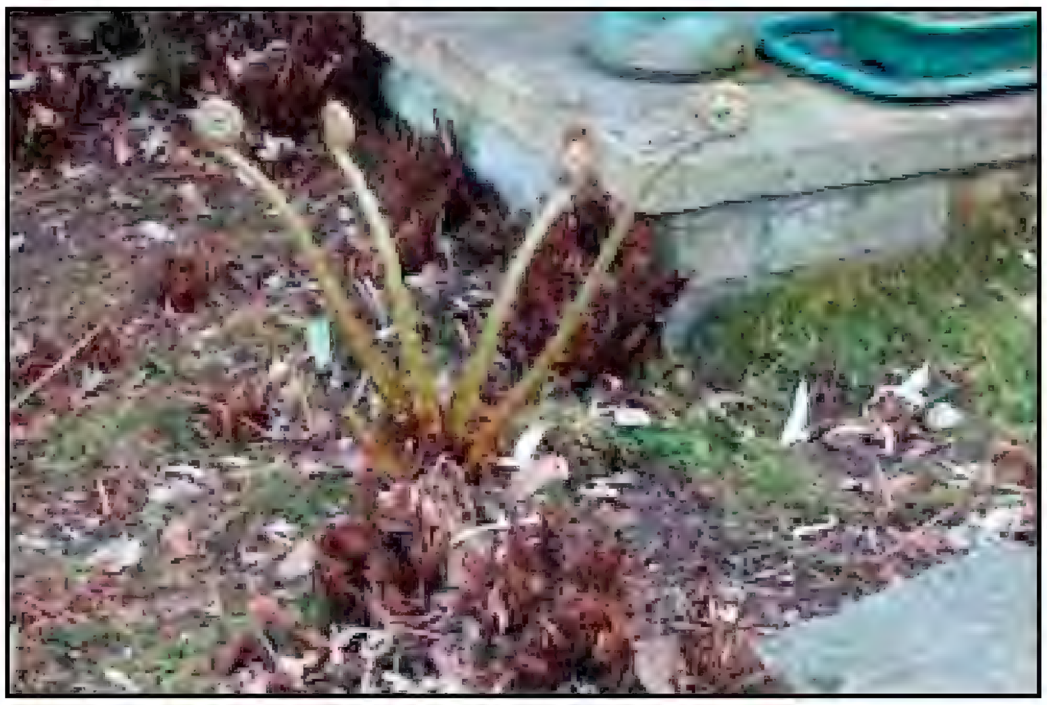

Fig. 3. The crosiers are starting to emerge

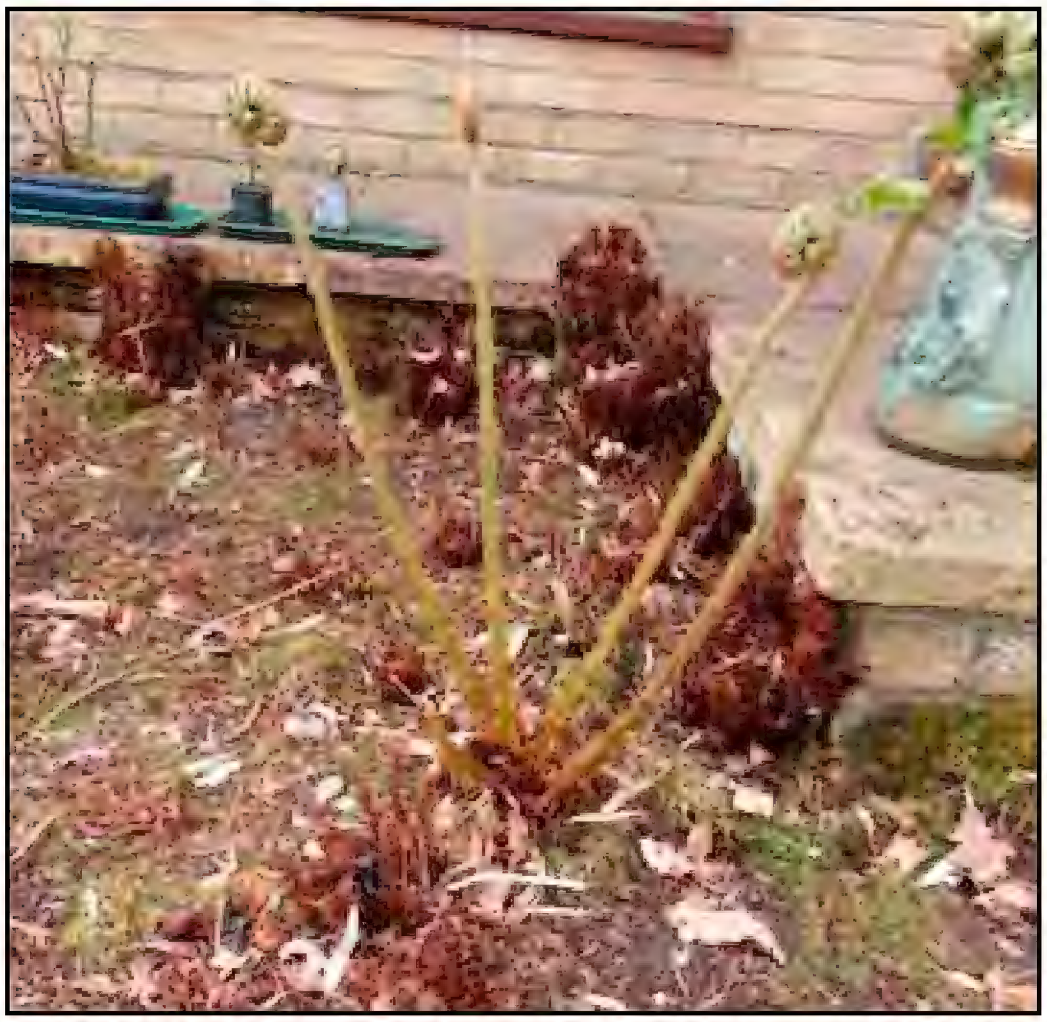

Fig. 4. More growth from the crosiers but the Blechnum and Onoclea behind have a bit of catching up to do

Ferns as Infectious Agents

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For many years as a microbiologist, I researched the bacteria that cause whooping cough, otherwise known as pertussis. It is a highly infectious disease the distressing symptoms of which are presented by the Mayo Clinic on the web at: https://www.youtube.com/watch?v=S3oZrMGDMMw

So what has this got to do with ferns? Quite a lot, I would argue. The whooping cough bacteria are coughed out violently into the air from the human mouth. The fern spores are discharged violently into the air from sporangia, as presented by Fernando Matos on the web at: https://www.youtube.com/watch?v=m3LmCBQvtl4

The pertussis bacteria and the fern spores then float in the air until they land somewhere. Depending on where that is, they may either perish or flourish.

With luck - from their point of view - the pertussis bacteria and the fern spores land in places where they can grow. For the pertussis bacteria, the lucky places are the moist surfaces within the noses, throats and lungs of non-immune people, from infants through to the elderly. Or, in a lab, onto the surface of culture dishes containing a suitable growth medium, such as Bordet-Gengou agar.

With fern spores a lucky experience is to be shaken out of a BPS Spore-Exchange packet so as to 'infect' the surface of moist, sterile compost or agar gel in a container providing 100% humidity, and illuminated. Under these favourable conditions the spores germinate, produce gametophytes and then sporophytes. The fern is thereby propagated. The spores can be described as having been 'highly infectious'. Unless this happened reliably we wouldn't have a BPS Spore Exchange.

In stark contrast, the spores of most ferns in a garden apparently don't encounter these favourable conditions. They are released in massive numbers, they blow around in the air but only rarely in my experience do they give rise to new fern plants. In a garden therefore, fern spores are 'poorly infectious'. At least most of them, for a lot of the time, seem that way.

I have a big clump of mature *Polystichum munitum* which has been in the garden for 30 years and produces a superabundance of spores year after year. Yet during the 30 years of spore shedding it has 'infected' only 3 other places in the garden (Fig. 1). None of these is closer than about 10 metres from the original plant. There are no new plants close-by, within the imaginary cone of spore-fallout from the parent.

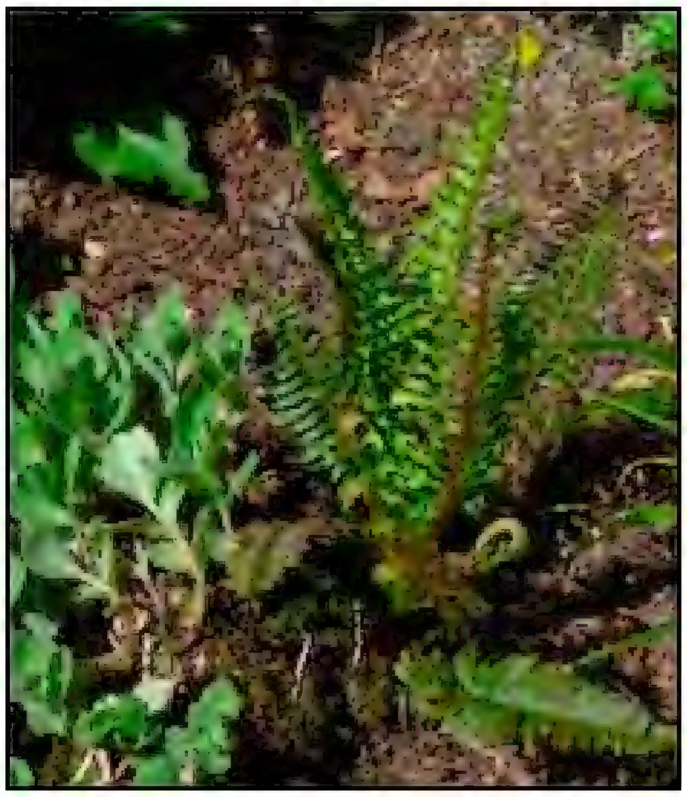

Fig. 1. *Polystichum munitum,* having spread by airborne spores in the garden, growing in the base of a clump of *Sedum spectabilis*.

Of the dozens of other foreign ferns in the collection, the only ones that have spread by spores within the garden during several decades of opportunity are *Adiantum pedatum, A. venustum, Blechnum chilense, Onoclea sensibilis* (Fig. 2), and *Matteuccia orientalis*. I am not aware of any of them having spread into neighbours' gardens.

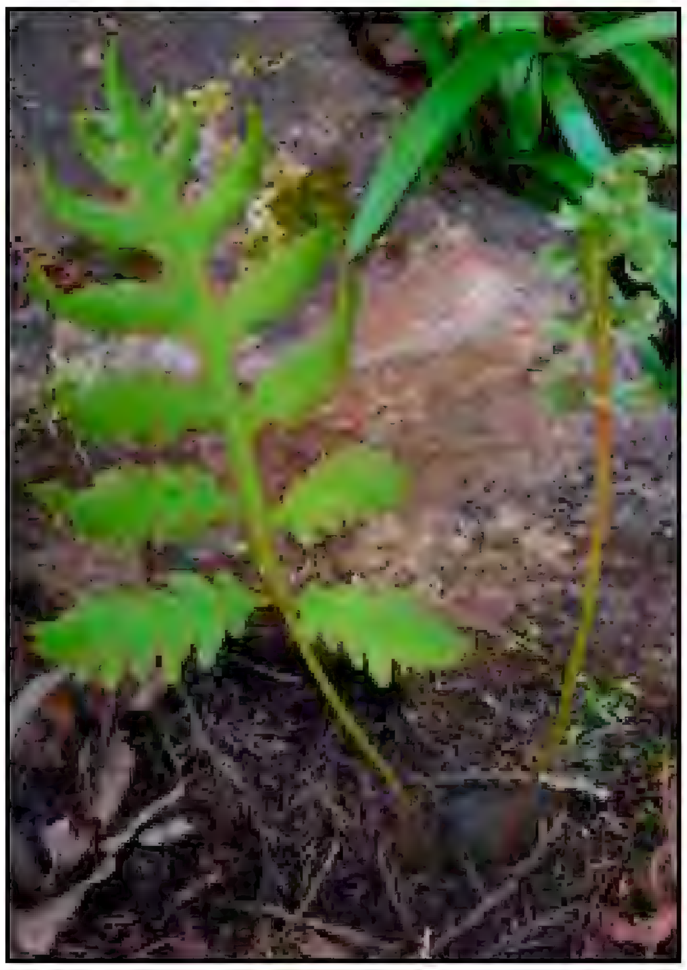

Fig. 2. Young plant of *Onoclea sensibilis* colonizing, by wind-blown spores, a shady rockery 30 metres from the nearest parent plant

Even with the native British ferns in my garden, only a very few have spread by spores during decades of cultivation. *Asplenium scolopendrium*, *Athyrium filix-femina*, *Dryopteris dilatata* and *D. filix-mas* are exceptions. They are prolific spreaders-by-spores, to the extent of needing to be weeded out (Fig. 3).

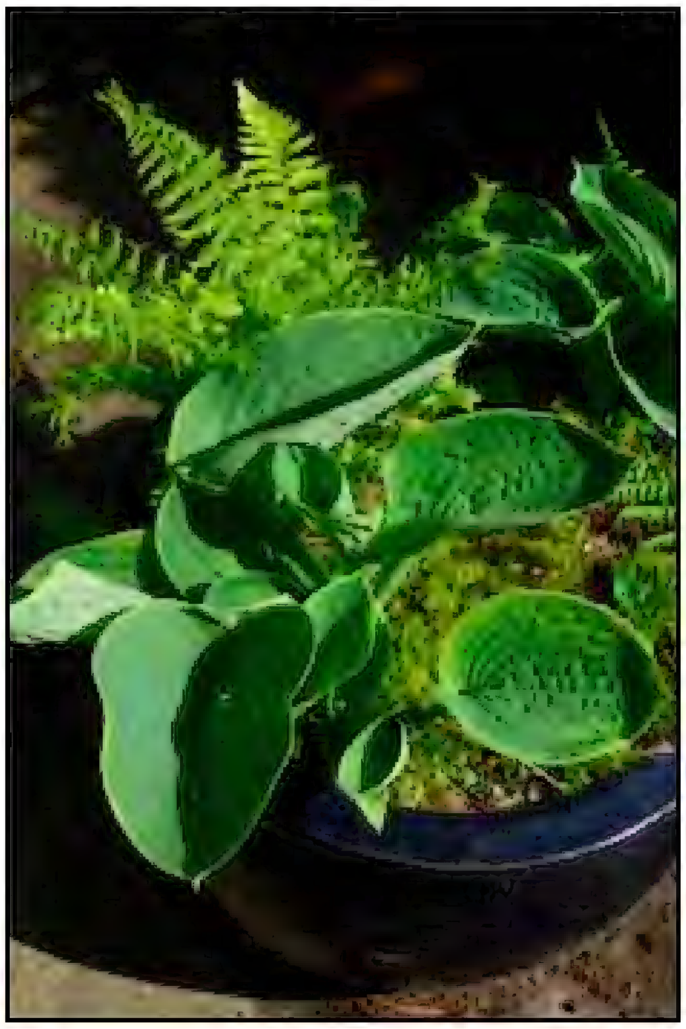

Fig. 3. Wind-blown spores of several native ferns and cultivars acting as weed ferns in a pot of Hostas.

Aside from these, most of the other native British ferns and their cultivars have had only a very few spore-spreading events in the garden over a period of decades. These rare spreaders-by-spores, include *Blechnum spicant, Cystopteris dickieana*, *Dryopteris affinis* 'Cristata the King', *Phegopteris connectilis, Osmunda regalis*, *Polypodium vulgare, Polystichum aculeatum* and *P. setiferum*.

I find it fascinating that famous fern collections, having been cultivated for decades and then fallen into decay, have typically not permanently 'infected' either their own ground or their surroundings, except with the odd specimen which is then remarked on with delight during a BPS field excursion many years later. This 'immunity to infection' is perhaps 'a good thing' since it means that the native mutants and foreign ferns are not particularly invasive. Those like myself who grow such ferns happily avoid condemnation as being ‘ecologically irresponsible’.

An enduring mystery for me is how the present British fern flora ever got established if it had to rely on spore spreading by the inefficient mechanisms that operate in my garden. The British Isles, at the end of the last Ice Age about 12,000 years ago, must have been largely fern-free. Did some spores travel in a single journey by air the thousand or more kilometres from refugia[1] in southern Europe after the last ice age? I find it difficult to believe that the British Isles became fern-populated by the feeble spore-spreading mechanism observed in my garden. And I also keep in mind the massive barrier of the English Channel from about 7,000 years ago.

On fern-distribution maps it would be nice if each dot had a pop-up box to inform where that particular ‘infection’ is believed to have come from. With genome fingerprinting this could become a reality.

Obviously fern spreading by spores long-distance must happen in the wild at least occasionally. But seemingly it occurs erratically on a timescale much longer than a human lifetime. One thinks of all those Southern-hemisphere *Blechnum* species which grow in Northern-hemisphere gardens but with only limited spreading by spores into their surroundings. In any case why haven’t the Blechnums kept arriving by air from the Southern Hemisphere, as a constant source of ‘infection’ down the centuries?

The narrative for explaining the British fern flora as having originated from aerial spores from Continental refugia[1] comes therefore with questions.

Q1: When the ice had gone, was there a period of unoccupied soil, warm conditions and a high-humidity, rain-every-day, climate to provide the conditions enjoyed by fern spores shaken out of a Spore-Exchange packet into a culture pot? Except that the spores were airborne from southern refugia[1]?

Q2: Returning to microbiology language, do soils contain ‘agents of soil natural-immunity’ to ‘fern-spore infectivity’? Do some flowering-plants, algae, fungi and soil animals such as nematodes serve as such agents? They can massively disrupt the expression of ‘fern-spore infectivity’ in culture pots? They make the culture pot ‘naturally immune’, or resistant, to successful fern-spore cultivation. Do they explain why fern spores are so poorly infectious in gardens and in the wild? And why it is essential that the growth medium for spore cultivation is sterilized? And preferably for the spores themselves to be treated with disinfectant to kill fungi and algae?

In signing off, I expect to continue cultivating ferns, breathing in spore-laden garden air, looking out for spreading-by-spores and observing ferns in the wild, while pondering where they came from. ☐

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[1] **Refugia** : an area in which a population of organisms can survive through a period of unfavourable conditions, especially glaciation

More Bradbury Nature Prints

The Royal Botanic Garden Edinburgh has very recently produced a new line of items, including coasters and notelets, decorated with reproductions of a selection of Bradbury Nature-Prints taken from Moore, T., *The Ferns of Great Britain and Ireland* (1855). The two notelets (see photographs) each show a selection of fronds taken from different plates; five fronds or groups of fronds are reproduced more than once, at different magnifications.

Adrian Dyer

The Confusions over Kalothrix

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Athyrium filix-femina 'Kalothrix' was a very beautiful and finely cut fern, as can be seen in Fig. 1. According to Jimmy Dyce's 'Fern names and their meanings' kalothrix means *"beautiful hair"* or as Charles Druery describes it, *"fronds cut into very slender, almost hair-like, subdivisions of silky lustre"*. During the very long history of this cultivar there have been a number of confusing issues that appear to have been intractable at the time.

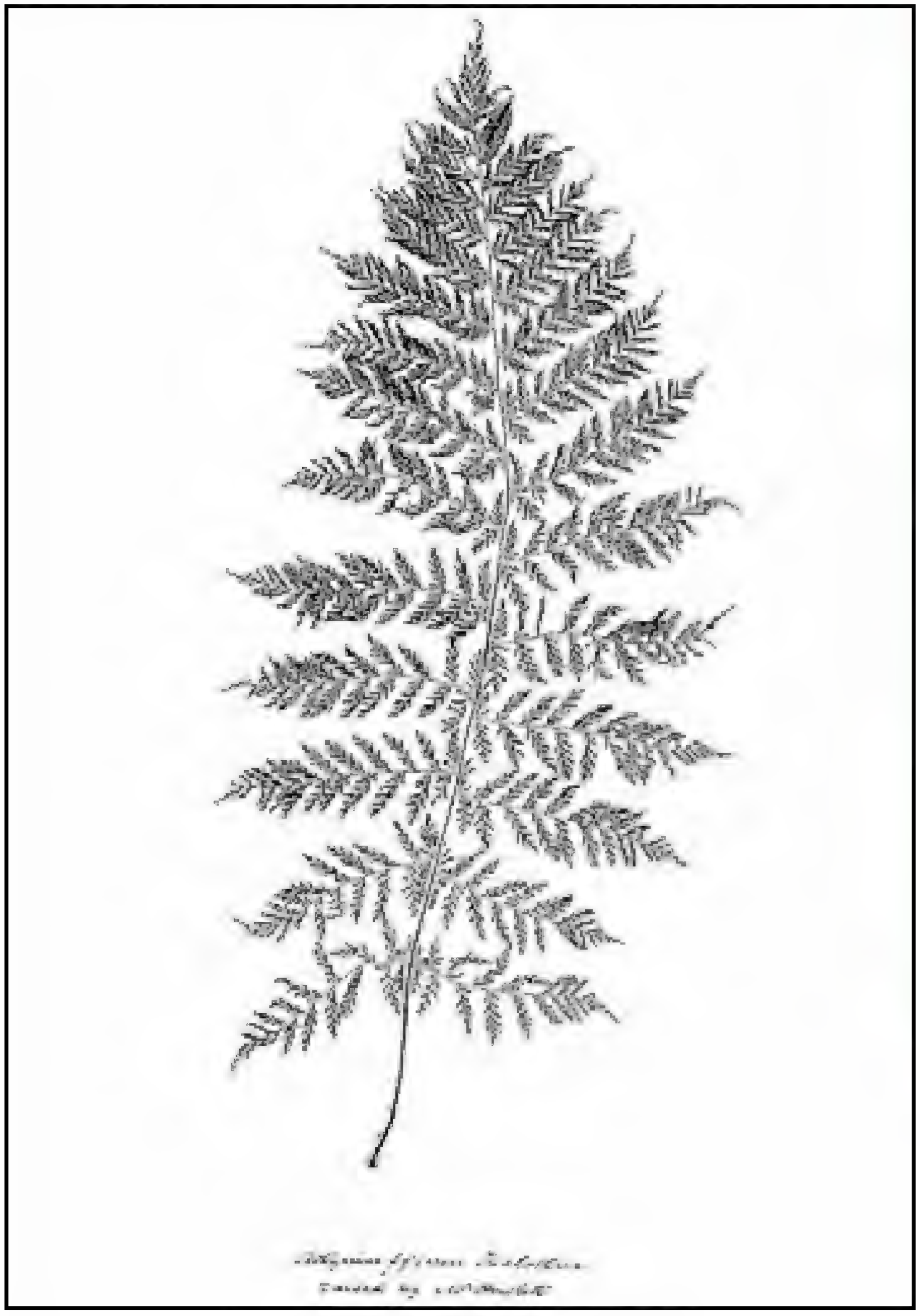

Fig. 1. *Athyrium filix-femina* 'Kalothrix'
Moore's 'The Nature Printed British Ferns'

Along with *Polypodium vulgare* 'Cambricum', *Athyrium filix-femina* 'Kalothrix' is the oldest known fern cultivar; a herbarium specimen quite similar to 'Kalothrix' exists in the Sherardian herbarium, which is part of the Oxford University herbaria (see Fig. 2). William Sherard was born in 1659, the eldest son of a Leicestershire landowner. Although Sherard studied law and graduated with a degree in 1683, he was particularly interested in plants and he studied botany in Paris. Sherard became a celebrated English botanist, tutoring the rich and titled and, as a consequence, he became a wealthy man. In his will, Sherard bequeathed his herbarium, library, notes and manuscripts to Oxford University, along with £3,000.

After Sherard's death in 1728 the herbarium was regularly added to until 1796, by which time it contained around 20,000 specimens. His herbarium is now one of the older parts of the considerably larger herbarium which contains over one million specimens. The 'kalothrix' in Sherard's herbarium was collected in the Mourne Mountains in Ireland and could be from 1690 when he stayed with Arthur Rawdon at Moira in Co. Down, making this specimen nearly 320 years old.

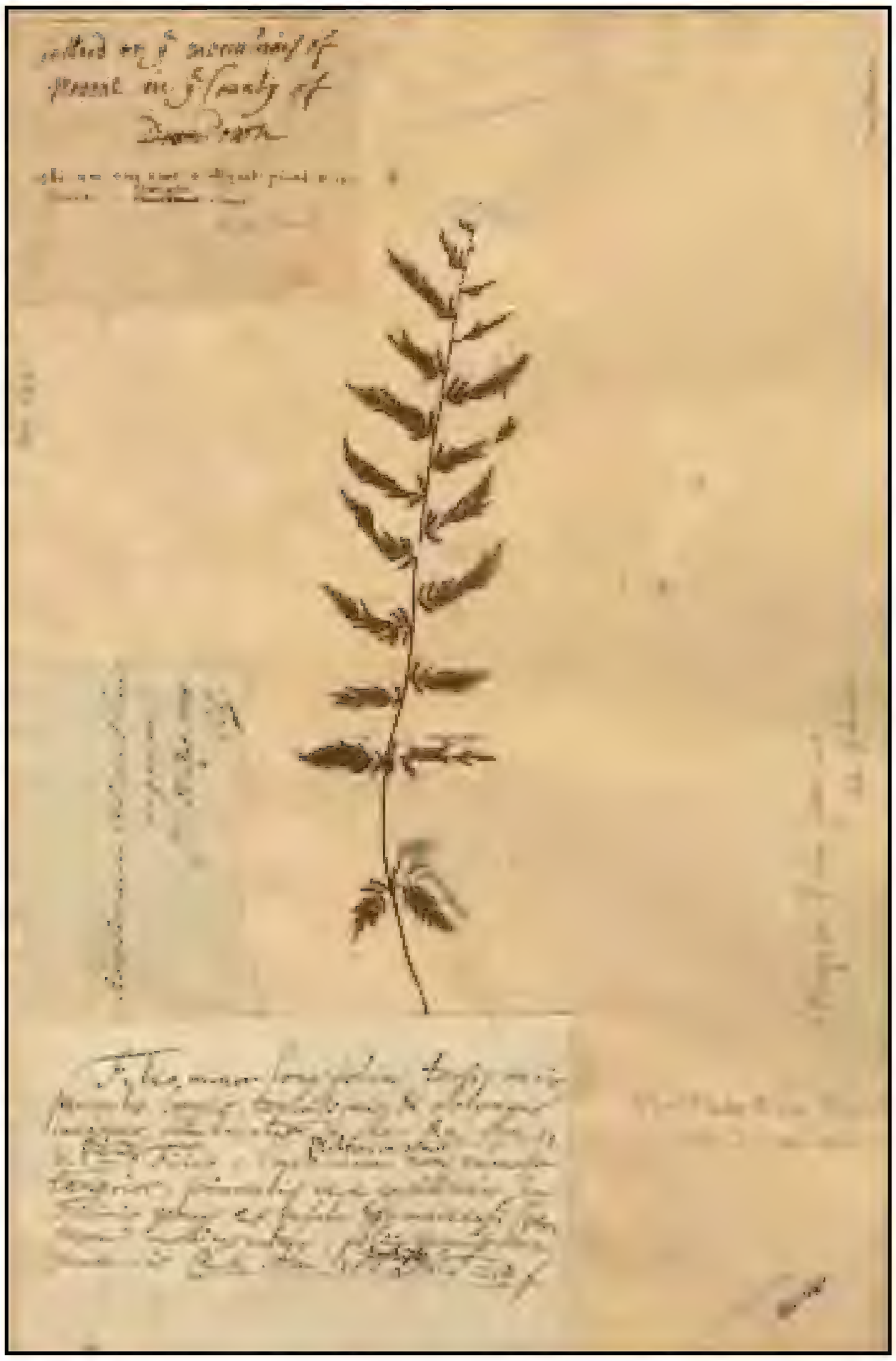

Fig. 2.Herbarium specimen of William Sherard's *Athyrium filix-femina* plumosum
(By kind permission of the Oxford University herbaria).

Dr. Stansfield writes in the report of his investigation, which he published in the 1910 Fern Gazette,

> *"Everything, in fact, points to the Mourne Mountains plant as the ancestor of the modern kalothrix.*
>
> *It is clear, from the number of varieties in the herbarium, that Sherard was a student and admirer of these things. It is therefore extremely unlikely that, upon finding so good a thing as kalothrix, he would leave it behind in the Mourne Mountains and content himself with a dried frond. If he were the man I take him to have been he would transfer the whole plant alive to his vasculum and afterwards cultivate it carefully in his garden".*

The Confusions over Kalothrix

Jimmy Dyce also shared this view and makes the very same point about Sherard lifting the plant and cultivating it in Dyce's article '*Athyrium filix-femina* kalothrix' in the 1983 B.P.S. Bulletin.

The fact that John Ray (sometimes spelt 'Wray'), an early parson-naturalist, is said to have written on the herbarium sheet *"his is a very rare & elegant plant & deserves a proper name"* was taken as proof that William Sherard must have lifted this fern and grown it on; why else would it require a *"proper name".* You will note on Fig. 2 that another hand has written next to Ray's writing *"Rays hand"* in pencil. The more observant of you will also notice that Dr. Stansfield has added his name to the herbarium sheet.

Confusion here comes from the connections with Oxford, of which there are a number. Dr. Stansfield amongst others confuses the issue further by attempting to somehow show that spore from Sherard's fern is the ancestor of *Athyrium filix-femina* 'Plumosum Oxford' and ultimately the 19th Century kalothrix (Fig. 1) but this would seem not to be the case. William Sherard lived in Eltham, Kent (now within Greater London) and attached to this house was a well known garden (known locally as 'the botanic garden') where he grew all his rare and unusual plants. Surely Sherard's *A.f-f.* 'Kalothrix' would have gone to Kent, if indeed he had dug the plant up, rather than to Oxford.

During the late 1800s another 'Kalothrix' was grown in the Oxford area. According to Dr. F.W. Stansfield, writing in the 1910 'Fern Gazette', there is some obscurity over the origins of this cultivar. He writes :-

> *"The only facts certainly known are that it dates from 1870, when a Mr. Howlett, an amateur grower from Oxford, raised a plant, or plants, from spores of a form of A. f-f-plumosum which was then growing in the Oxford Botanic Garden. Stimulated by this result Mr. Sim, of Foots Cray, then a prominent nurseryman, obtained a division of the Oxford plumosum and also one of a plumosum raised by Mr. Howlett from the same source. From one of these plants (he was not sure which) Mr. Sim raised in 1874 a batch of some hundreds of seedlings of which ten or twelve per cent, were Kalothrix, the rest being plumose, subplumose, and normal forms of Athyrium filix femina. The oldest known ancestor of Kalothrix was then this plumosum in the Oxford Botanic Garden".*

Mr. Moore tells us in his book 'The Nature Printed British Ferns', that the 'Oxford Plumosum' fern originally came from Chelsea and that it is likely to be 'Plumosum Horsfall' (Fig. 3) as a crown had been sent to Chelsea by Messrs Stansfield shortly after its discovery – probably about 1861." Col. Jones corroborates this story in the notes that accompany his nature prints *"Mr. Baxter writes that it came from Chelsea Botanic Gardens".* Mr. Baxter was in fact, the Curator of the Oxford Botanic Gardens at the time they acquired the fern from Chelsea.

A.f-f. 'Plumosum Horsfall' was found in the autumn of 1857, at Skipwith, four miles north-east of Selby in North Yorkshire, by James Horsfall, who was a gardener employed by the Stansfields at their Vale Nurseries in Todmorden.

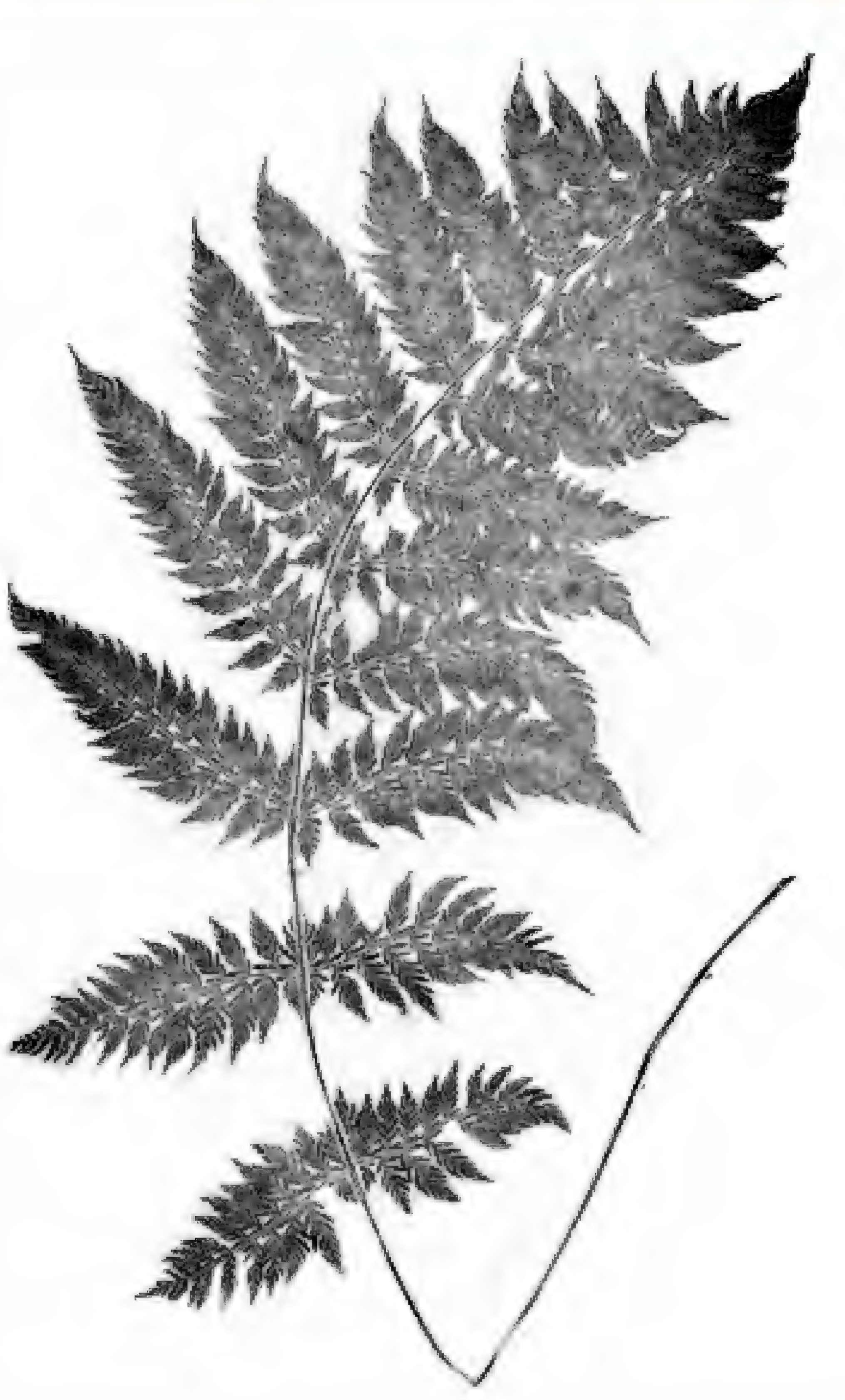

Fig. 3. A probable 'Plumosum Horsefall' from Moore's 'The Nature Printed British Ferns'

Despite the information about the 'Oxford Plumosum' being 'Plumosum Horsfall', Stansfield and his contemporaries choose to disregard this and continue treating the fern as if it were two distinct cultivars. Col. Jones writes

> *"It is strange, however, considering the very marked tendency, in the seedlings from the Oxford plant, to run in the kalothrix strain, that no trace of this strain should ever have been detected among the thousands of seedlings raised by Messrs. Stansfield and others from the Yorkshire plant".*

The possible explanation for this observation is that kalothrix prothalli have a habit of producing fronds later than the other prothalli, and it is just possible with the pressures of commercial fern growing that Stansfields nurseries *"and others"*, couldn't afford to hang about, and pans or seed trays were discarded after the plumosum Horsfall *"seedlings"* had been 'pricked out' but before kalothrix fronds had begun to appear.

Dr. Stansfield also writes that there are many links missing in the chain of evidence connecting the 19th Century kalothrix to Sherard's fern. On a visit to the Oxford Botanic Gardens, probably in 1909, to see Sherard's herbarium specimen (which is no doubt when he added his name to Sherard's herbarium sheet) and to seek evidence to help clear up the confusion, Stansfield writes

> *"There was, however, only one form of plumosum in the gardens (labelled simply A.f.f. plumosum). This was not the Horsfall plumosum, but was unmistakably the plumosum which comes from the spores of kalothrix and from which in turn kalothrix can be raised. It has some resemblance to the Horsfall form, but is a dwarfer plant, thinner in texture, less acute in the ultimate segments, and when exposed to the sun, as it was here, it burns to a peaty brown which is very characteristic and unmistakable".*

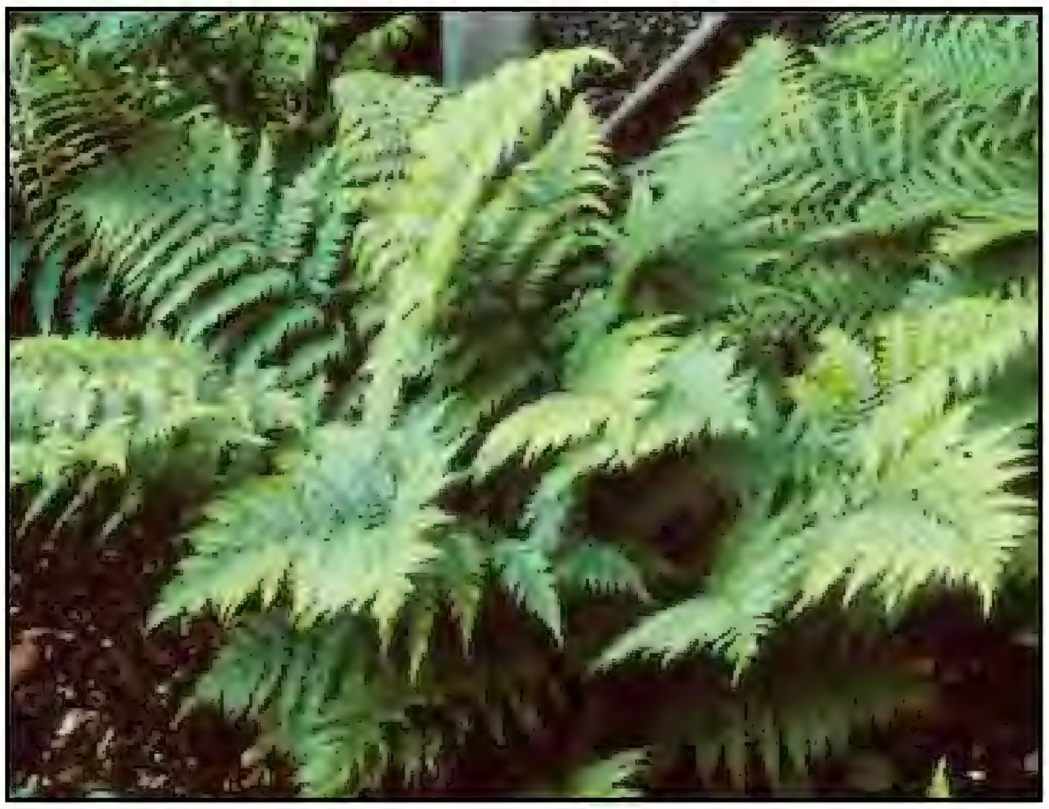

Fig. 4.'Oxford Plumosum' that was growing in the Oxford Botanic Gardens in the 1980s.
Photo: J.W. Dyce 1968
(by kind permission of the BPS slide archive)

These differences that Stansfield lists between the supposed two cultivars could be down to growing conditions and, on reflection, it doesn't' sound like the 'Oxford Plumosum' was being particularly well looked after at the time. What plumose lady fern would not burn if grown out in full sun? Stansfield continued to believe that somehow there was a link between Sherard's fern and that growing in the Oxford Botanic Garden, a view also supported by Jimmy Dyce and expressed in his 1983 P.B.S. Bulletin article.

It appears that the 'Oxford Plumosum' survived in the Oxford Botanic Gardens until the early 1980s (Fig. 4). The BPS Bulletin for 1977 reports a meeting held at the Botanic Gardens on the 13 August (the previous year)

> *"It was pleasing to note that Athyrium filix-femina 'Oxford Plumose' is still growing there – a fern with a most intriguing history, it is now over 250 years old".*

It is believed that the fern was moved sometime around 1978/79 to a new location within the garden, but this new site probably received more sun, or in some way was less suitable, and it didn't thrive and we assume that the Oxford plumosum was lost.

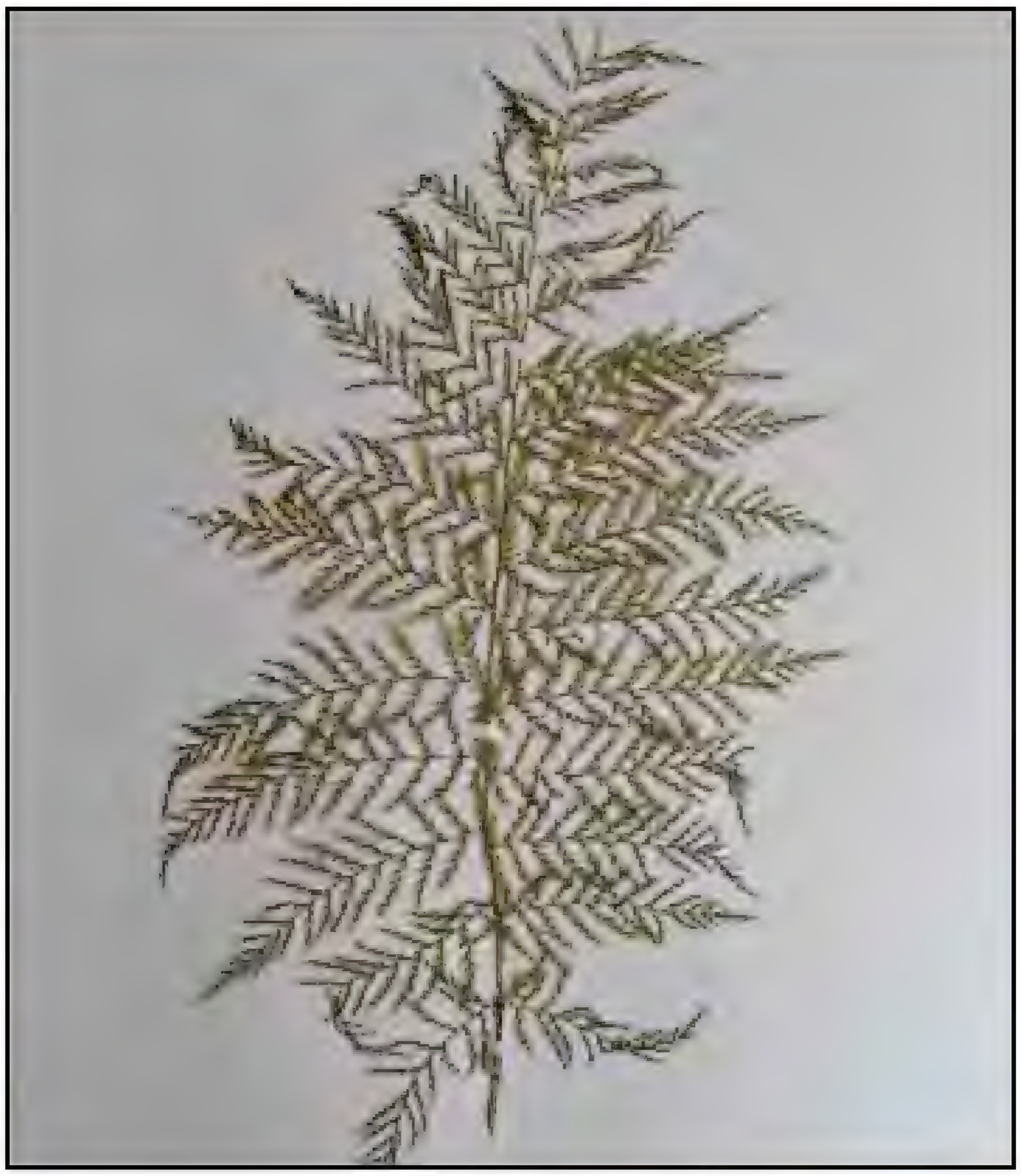

Fig. 5.'Kalothrix Coughlin' grown by BPS members Ray and Rita Coughlin from 'Plumosum Penny' spore

The 'Oxford Plumosum' is now no longer growing in the Oxford Botanic Gardens but if it survived to such a recent date as the 1980s it is exciting to think that it could be growing in an old garden somewhere. Crowns of this cultivar were given by the Oxford Botanic Gardens to fern enthusiasts and as a consequence this old cultivar is high on the 'wanted' list for members of the Cultivar Group, who seek to return it to cultivation.Do you know where one is growing?

Sadly the 'Kalothrix' ferns bred by Mr. Sim and Mr. Howlett are long lost but fortunately a Mr. Penny of Lancaster bred a '*robust*' plumose cultivar from 'Plumosum Horsfall', and called it *A.f-f.* 'Plumosum Penny'. This fern is still with us today and it does usually yield a 'Kalothrix' sporeling or two, a characteristic it almost certainly inherited from its parent; confirming 'Plumosum Horsfall' was indeed the 'Oxford plumose'.

In the very early 1980s the most magnificent 'Kalothrix' was bred by Ray and Rita Coughlin from 'Plumosum Penny' spore. This wonderful specimen was grown in a cold greenhouse for protection against the elements and was particularly beautiful and delicate (Fig. 5). This 'Kalothrix' was admired by all who saw it. Jimmy Dyce wrote at the time,

> *"Two of our enthusiastic amateur fern breeders, Ray & Rita Coughlin, who live in the Midlands, have bred a plant which in every way seems to match up with the old 'Kalothrix'. Surprisingly, the spore came from the variety 'Plumosum Penny".*

He goes on,

> *"it is good to have the kalothrix name back among the Lady Fern Varieties."*

The Confusions over Kalothrix

About the same time Martin Rickard also raised a distinct form of 'Kalothrix'; from a plumose cultivar; although he couldn't remember which, it was most probably 'Plumosum Penny'. To distinguish these two plants it was agreed that Ray and Rita Coughlin would label their plant 'Kalothrix Coughlin' and Martin's plant would be labelled 'Kalothrix Rickard'.

Martin eventually passed on his plant to a well known nursery so they could propagate and sell it; however, by his own admission Martin's *"hand writing is not great"*, so the nursery struggled to read the label, eventually misinterpreting the name as 'Kalothrix Rumboid'. The fern was sold under this name for at least twenty years until the mistake was realised and the cultivar was finally correctly named *A.f-f.* 'Kalothrix Rickard'.

Should you be lucky enough to own an *A.f-f.* 'Kalothrix' or be given a specimen, care with the growing conditions is paramount. Col. Jones writes in the notes that accompany the 'Kalothrix' Nature Print,

> *"This variety requires extreme care in cultivation, strong light being fatal to its beauty. When well grown it is perhaps the most delicately beautiful of British ferns. Some of the happiest results have been obtained under treatment suited to filmy ferns, to which indeed in appearance it bears no slight resemblance".*

Jimmy Dyce reiterates Col. Jones's advice but gives us a more detailed account of the care required for growing 'Kalothrix' in the B.P.S. Bulletin of 1983

> *"It is said it was not really difficult to grow, but it required very protected conditions if its delicate beauty was to be seen at its best. It could only be grown under glass. Exposure to strong light, air, dryness, wind or even draught was rapidly fatal, and water thrown over the fronds was a sure way to injure them. Good drainage was necessary else it damped off during the winter. The happiest results were obtained under filmy-house conditions, standing the pot on the floor about 2 inches above the water level. Low temperature was no hardship".*

Over the years there have been a number of selected forms of 'Kalothrix', Druery describes a crested type which appeared spontaneously in a sowing of his own 'superbum' section, with no less than 7 plants originating from one prothallus. 'Kalothrix Lineare' and 'Foliosum' were also raised from 'Kalothrix', although Druery tells us these cultivars had a habit of partially reverting back to 'Plumosum Horsfall'. 'Kalothrix Laciniatum' and a hybrid between 'Kalothrix' and *A.f-f.* 'Craigii' were also produced and are discussed in the Fern Gazette for 1927. Sadly none of these treasures are with us today but maybe, with enough enthusiasm, it is possible they could be bred again.

For those of you who would like to view Sherard's kalothrix online or at the Oxford University herbaria, the herbarium sheet number is, Sher-1542-10

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Herbarium specimen of William Sherard's *Athyrium filix-femina plumosum* – by kind permission of the Oxford University herbaria.

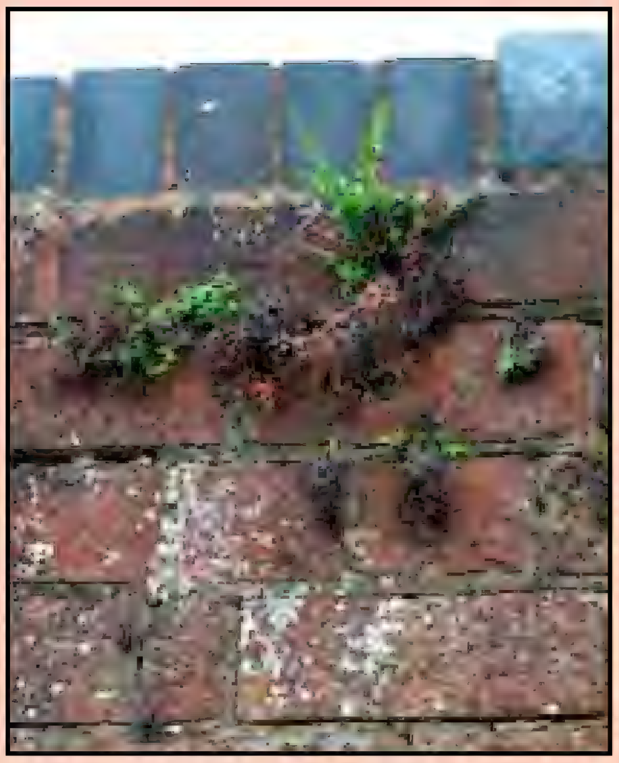
BPS Slide archive. Image of A.f.f. Oxford plumosum – J.W. Dyce 1968

On the Wall at Studley

The Arden restaraunt wallpapaper with its fern theme of reproductions of pressed specimens

For afficionados of Warner Leisure Hotels, Studley Castle in Warwickshire offers a more sophisticated variation of the Warner experience. Opened in March 2019, the hotel's interior décor is divided into differently themed areas and part of the Arden Restaurant has a fern theme. The wallpaper design reproduced the pressed specimens in vogue at one time. The only living ferns that I saw during a stay in May 2019 were examples of *Asplenium adiantum-nigrum* in the stables area on some sections of ancient wall that had been incorporated into Warner's redevelopment of the site. But as development was still in progress parts of the grounds were inaccessible, so who knows what else might be waiting to be discovered? There's an excuse for a return visit!

Roger Amos



Asplenium adiantum-nigrum growing on the ancient wall of the stable at Studley Castle

Citizen Science: a Tool for Fern Inventories in Data-Poor Countries

Gabriel Massaine Moulatlet
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Tropical countries are known for their high biodiversity. Ecuador is no exception and some of the most studied sites in the tropics are found there. National Parks like Yasuní and Cuyabeno are worldwide-famous visiting areas for researchers and tourists who seek an experience with extremely diverse flora and fauna. Despite the intensive sampling and species observations in these areas, still most parts of Ecuador are data gaps due to the difficulty of access or the lack of higher education institutes that can help to promote systematic sampling and develop research projects are lacking.

This situation began to change in 2014, when Ecuador opened universities with free education in remote areas of the country, in order to promote local development and to service people who otherwise would not have the opportunity to study in big centres such as Quito or Guayaquil. In Tena, (Fig 1) a small town of 20.000, located in the Andean foothills (ca. 600m elevation) was founded the Ikiam University, where I am currently working. Since its opening, Ikiam´s priority has been the study of biodiversity, as the campus is surrounded by national parks and large patches of forested areas. Ikiam has implemented biodiversity programs, but its efforts in mapping biodiversity are still in it's early stages.

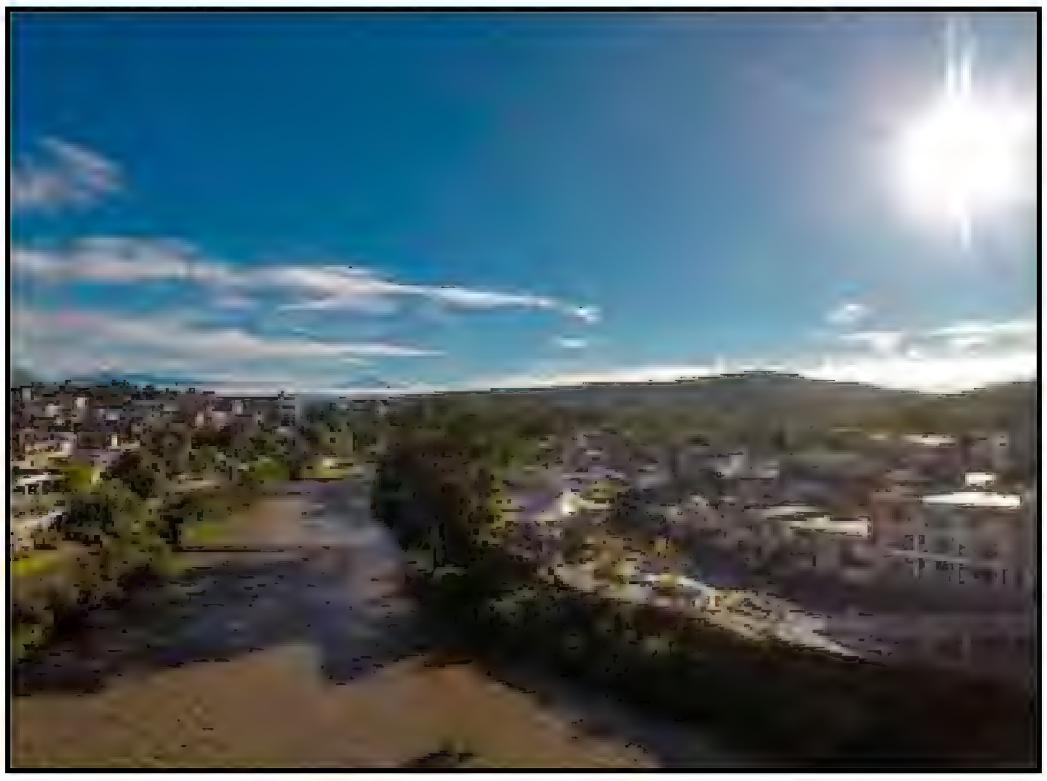

Fig. 1. Tena, a small town located at Ecuadorian Amazonia, on the Andean foothills. In the background, the Sumaco volcano. The river crossing the city is the Tena River

As part of the strategy to unravel local biodiversity, Ikiam joined forces with the Ecuadorian National Museum of Biodiversity to participate in the City Nature Challenge, an event organized by the Natural History Museum of Los Angeles and the California Academy of Science. This event aimed to determine which is the most diverse city in world, through citizen science. Every year, on a certain date, cities get organized to photograph local biodiversity and upload the pictures in Inaturalist web platform. Several criteria are used in deciding the winner: number of participants, photographs, and species identified.. During this year's challenge I was in charge of organizing groups for documenting the ferns of the urban area of Tena. Although a small town, Tena is intensively urbanized with few green areas, so the visits were mainly in a local park of about 8ha located by the Tena River (Fig. 2).

From April 26 - 29, 2019, 1,185 people made 37,965 observations of 2,653 species in the urban area of Tena. Out of these observations, 547 were of ferns, representing 70 named species. Although the identification of all pictures to species level was not possible, there are some interesting data. The most common species were the terrestrial *Pityrogramma calomelanus* and the epiphyte *Nephrolepis cordifolia*; both were abundant at Tena`s local park. Common genera found were Nephrolepis, Tectaria, Microgramma, Pteridium, Cyathea, Asplenium, Phlebodium, Lonchitis, and Serpocaulon. In total 44 lycophytes were observed, mostly Selaginella, although none of them was identified to the species level.

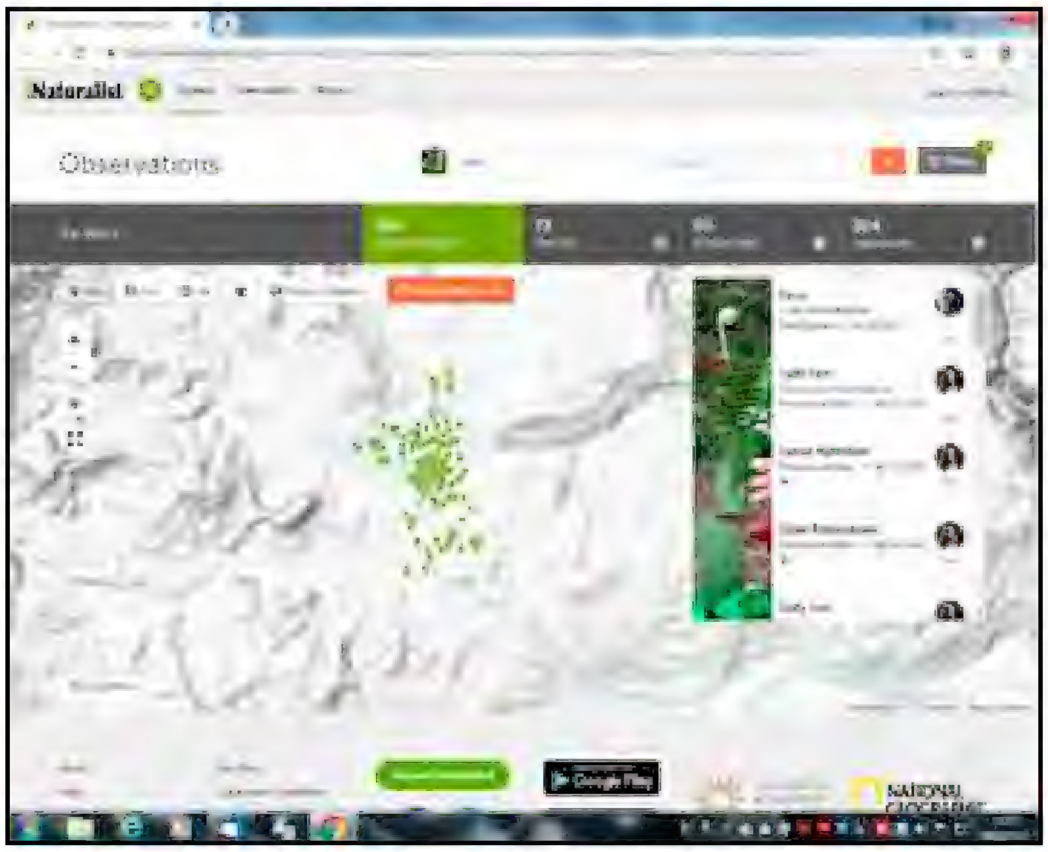

Fig. 2. Points indicating where fern pictures were taken in the urban area of Tena. Tena`s local park is located where the higher concentration of points are found

Some species were registered for the first time in the area. For instance, we found *Adiantum pulverulentum* and *Cyclopeltis semicordata*, two species that have been recorded on the eastern side of the Andes. According to the platform Global Biodiversity Information Facility (GBIF), they have been reported as occurring in the Low Amazonian forests of Ecuador below 400m elevation, but our new observations expanded the range of these species. Their presence also helps to understand a bit about the local environmental conditions. Both species are indicators of soils with high concentrations of nutrients such as calcium, magnesium, sodium and potassium. It makes sense! Tena is located by the confluence of the Rivers Pano and Tena that drain from the sediment-rich slopes of the Andes and deposit these sediments on the river banks and alluvial terraces during intense rain periods. The presence of these indicator species can be useful to validate available environmental maps and create new ones based on known preferences of ferns for environmental conditions. The citizen science project helped to connect biological and environmental information.

Although we can´t be conclusive about several species identifications, this first intensive inventory resulted in a preliminary fern list that can be used as base to build a proper species list for the area. For that, we can count on the expertise of people in identifying ferns using pictures.

When observations are uploaded to the Inaturalist platform, members from different parts of the world can comment and suggest identifications. When three members are in agreement with the identification, the observations areflagged as having "research grade" (Fig. 3), having more reliability to be used in research projects.

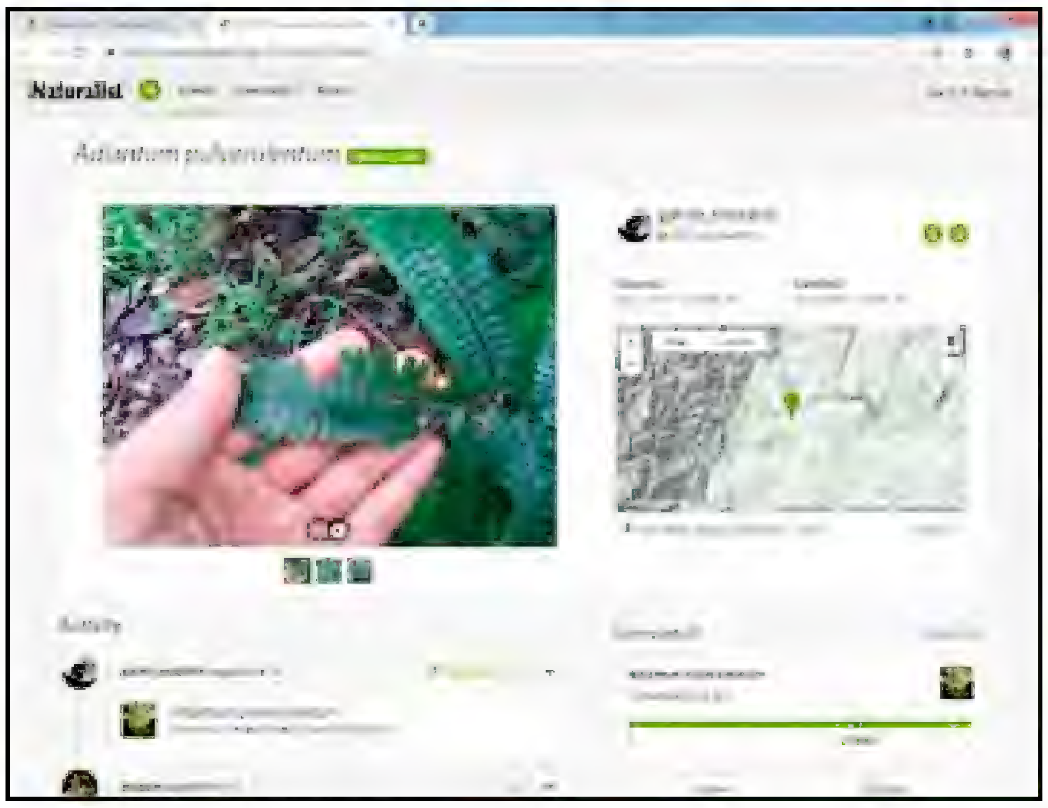

Fig. 3. Print screen of Inaturalist page. In the Activities section, two members are discussing on the identification of an *Adiantum pulverulentum*

Overall, the experience of organizing this massive citizen science sampling effort was positive in many aspects. For fern ecology, species and genera were for the first time observed in the area and we expanded their known distributional ranges; socially, we managed to have people (many non-academics) seriously engaged in this activity; at management level stakeholders are now discussing how to increase conservation of the few urban forest remnants and have approached Ikiam to discuss future projects and collaborations.

Fig. 4. Families were often seen at Tena's local park

The citizen science experience in Tena was a surprise. When engaging local people in naturalist activities, the researchers are helped in data collection. At the same time, the participants get an interest for the biodiversity and have good time with their relatives and friends. It is still early to say what will be the benefits in organizing citizen science activities in small, non-wealthy and remote places like Tena. However, during the 4 days of the event, the city's local park was packed with families, couples, enthusiasts and students taking pictured of every single species that could be found. No wonder, Tena ended up the challenge among the top 5, above other 155 cities in the world.

Personally, I have now more than enough material to keep on studying ferns with my Ikiam students. The citzen science and it tools are part of movement that will certainly contibute fo'sr the mapping of biodiversity.

Fig. 5. Participant searching for interesting animals and plants at Tena´s local park

Fig. 6. An Ikiam student taking pictures of a Tectaria

Hardy *Blechnum* in Cultivation

Tim Pyner (In Memoriam)

First published in "The Plantsman" and reproduced with their kind permission

Blechnums provide some of the best-known and most useful ferns in cultivation. Commonly known as hard or water ferns, the tough, evergreen fronds are architecturally pleasing and create an effective background to the often colourful young croziers. Only a handful of species are well known but a wider selection is grown by enthusiasts. Many of these lesser known species make attractive garden plants.

In this article I will discuss the most worthwhile species that I have found to be winter hardy over a number of years in coastal Essex, plus a few others grown elsewhere.

Classification and morphology

With around 200 species, *Blechnum* is the largest genus in the family Blechnaceae. Most species occur in the southern hemisphere. The family includes 7 or 8 other genera, *Woodwardia* and *Doodia* being frequently cultivated. Recent molecular studies have placed Blechnaceae in a group of families that includes Thelypteridaceae, Onocleaceae (Schuettpelz & Pryer 2008) and Athyriaceae (Christenhusz *et al.* 2011). *Blechnum* itself requires further study and generic changes are certain to occur in the future (Smith *et al.* 2008, Christenhusz *et al.* 2011).

The stems of *Blechnum* are woody rhizomes, creeping or erect, sometimes forming trunks. The fronds are pinnate or pinnatifid. The frond stalk (stipe) is scaly to some degree as is the frond midrib (rachis). The leaflets (pinnae) can be stalked or sessile (adnate). The spores are borne on specialized fronds known as fertile fronds (the normal fronds are referred to as sterile fronds). The sterile and fertile fronds can be similar in appearance (monomorphic) or differ (dimorphic). Most of the hardy species bear dimorphic fronds.

In this article I have attempted to group the species discussed using characters that show natural relationships. However, in some cases the characters are superficial. Unless stated, frond descriptions refer to the sterile fronds.

Blechnum chilense group

These species have strong and creeping rhizomes, robust and fully pinnate dimorphic fronds, and pinnae that are shortly stalked, strongly veined and toothed. The first four species have the lowest pinnae on the frond not or hardly shorter than those above. The other two species have lower pinnae that decrease in size down the frond.

The various species range throughout temperate regions of the southern hemisphere. They are among the most useful ferns for gardens, being of moderate to large size with tough evergreen foliage, colourful new growth and easily cultivated. Many of these species have previously been classified as *B. capense*, but this name is now restricted to African plants. Plants from South Africa are supposedly in cultivation, but the vast majority in gardens will be one of the following.

Blechnum chilense (syn. *B. cordatum*)

This well known species is deservedly one the most popular garden ferns. It is unfortunate that two names are in current use. *Blechnum cordatum* has priority but there is some doubt regarding its conspecifity with *B. chilense*. I have chosen to use *B. chilense*, not least because Australasian species in this group have been subject to careful revisions that have resolved their taxonomy and recognized additional species. Recent authors (e.g. Kessler *et al.* 2007) consider a detailed study of the species complex in South America is required. *Blechnum chilense* in the narrow sense is native to temperate South America and can be abundant in high rainfall areas.

In ideal conditions this magnificent species can produce fronds reaching 150cm long and 30cm wide. The new fronds are reddish, maturing to dark green. The stipes are clothed with broad, brown scales and the pinnae tend to have strongly wavy margins. In large gardens old plants of *B. chilense* can form impressive colonies that dominate extensive areas (Fig.1.).

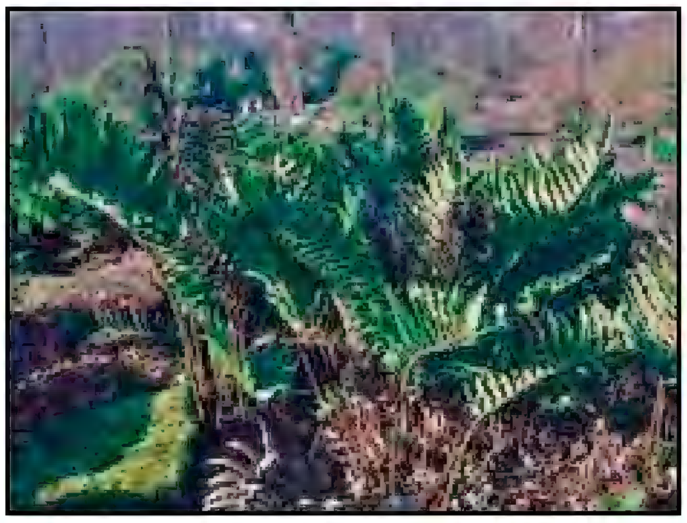

Fig. 1. *Blechnum chilense* forming a large colony

Blechnum wattsii

This species, native to eastern Australia, is surprisingly hardy. It superficially resembles *B. chilense* but is lower growing, with fewer, flat pinnae. The young fronds are reddish and even mature fronds retain a brownish tint. This is an elegant fern with fronds up to 60cm long that is useful in smaller gardens where *B. chilense* may be too vigorous (Fig. 2.).

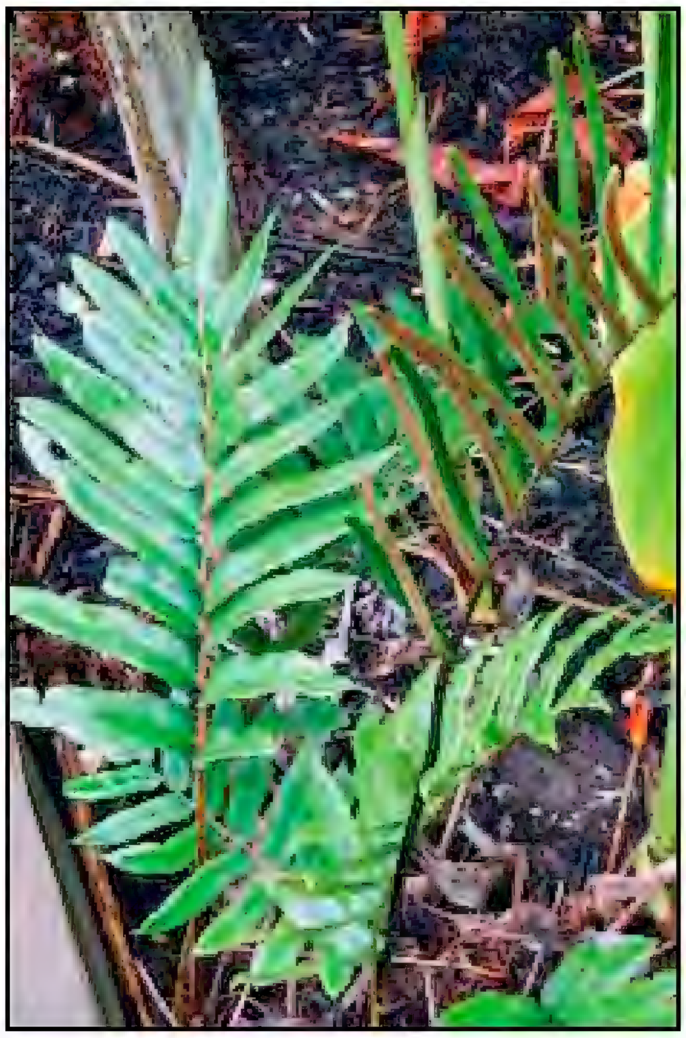

Fig. 2. *Blechnum watsii*

Blechnum procerum

Native to New Zealand, this is a superb garden fern. The sterile fronds have few, rather short, broad pinnae that are dark, bronze-green during the growing season. In winter they take on a glorious orange-brown hue which lights up the area where it grows. The fertile fronds are erect to around 40cm, contrasting with the strongly spreading sterile fronds (Fig. 3.).

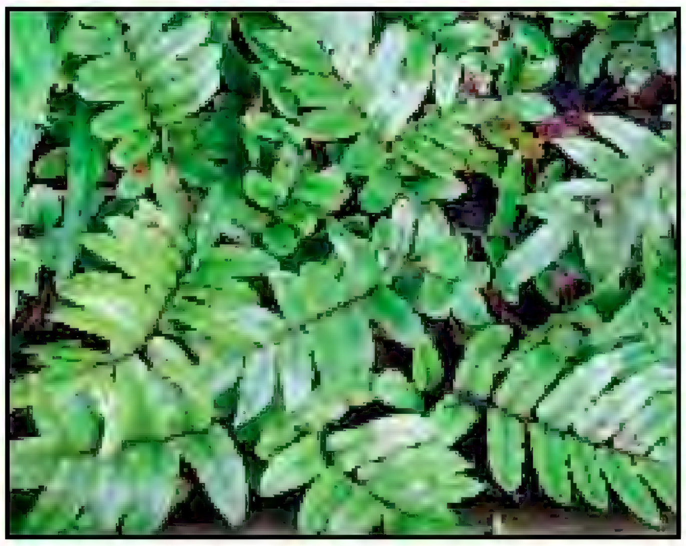

Fig. 3. *Blechnum procerum*

Blechnum montanum

This fern resembles *B. procerum*, but the fronds, to 50cm, are more glossy with curved and tapered pinnae (Fig. 4.). I have not noticed any marked change in frond colour in winter. It is endemic to New Zealand at relatively high altitudes and I have found it rather slow-growing compared to other species in the group.

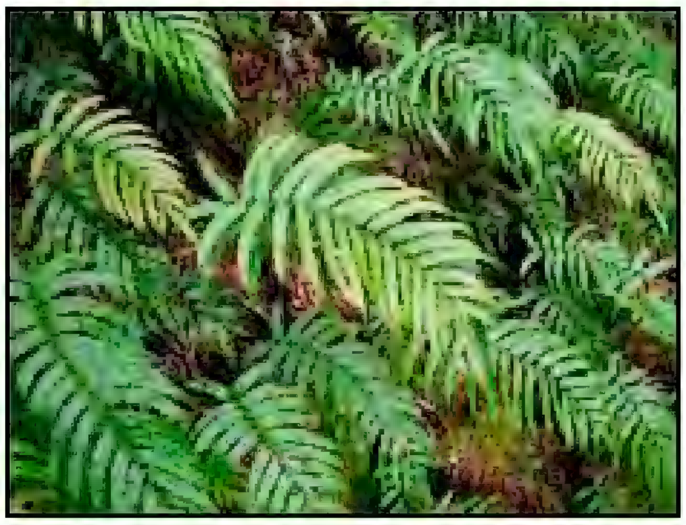

Fig. 4. *Blechnum montanum*

Blechnum novae-zelandiae

Until recently, this and the previous species were confused with *B. capense*. Chambers & Farrant (1998) resolved the taxonomy of the group in New Zealand and this species was circumscribed to include the endemic lowland plants of that country.

It is hardy in Essex but remains small, with fronds of 30–40cm, but with greater humidity it is much larger, up to 120cm. Even small plants produce some of the most colourful fronds of any hardy *Blechnum*. Bright light is required to develop the pigments which can range from bright pink to deep orange.

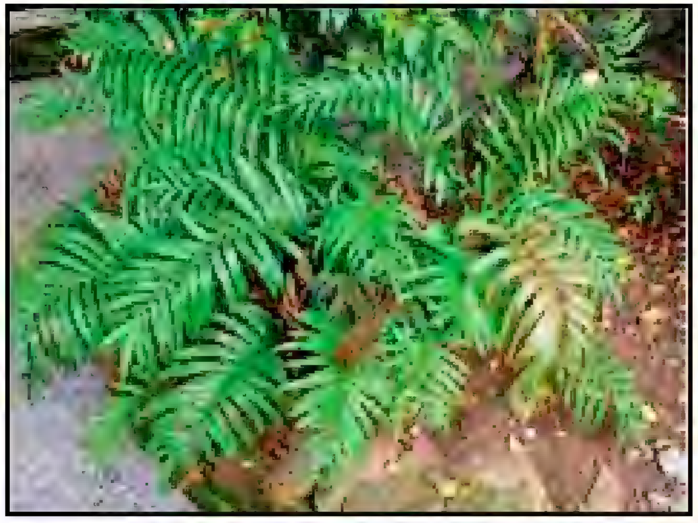

Fig. 5. *Blechnum novae-zelandiae*

Blechnum minus

This is a very attractive species that is native to southeast Australia. It is unclear whether similar plants in New Zealand are conspecific. Despite the epithet, *B. minus* can get quite large and old plants often form short trunks. The rhizomes spread slowly and the fronds are glossy, and orange to pink when young. The fronds are less resistant to cold than other members of the group, but many colourful new fronds are quickly produced in the spring (Fig.6).

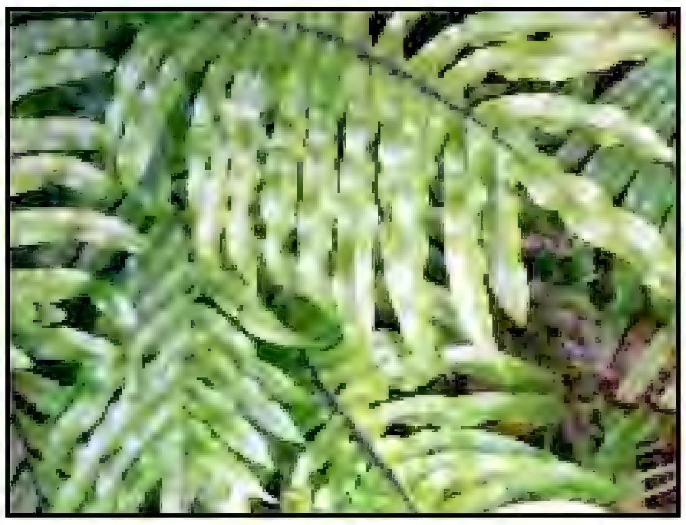

Fig. 6. *Blechnum minus*

Blechnum magellanicum group

This group contains some of the largest and most beautiful hard ferns. They can form massive trunks, sometimes 3–4m high in the wild. These large plants may be centuries old and can form magnificent colonies. Plants grown in the UK are smaller but still form striking plants.

The fronds are dimorphic, and the sterile pinnae are adnate to the rachis with only the lowest ones stalked. Rudimentary pinnae reduced to small flanges flank the stipes. The pinnae margins are entire.

Blechnum magellanicum

This is the hardiest of the trunked species, thriving in most of the UK. The trunk is stout, reaching 2m in the wild. The fronds are large, glossy, pale and rather whitish below, and usually 50–80cm in cultivation but up to 150cm in the wild. The dense blackish scales on the rhizome and stipes are stiff and have been compared to pig bristles. The fronds are often coated in stalked glands making them sticky to the touch, the fertile fronds particularly so.

Blechnum magellanicum is a highly impressive fern and seeing a group of large plants gives a primeval atmosphere in sheltered gardens (Fig. 7.). It is hardly conceivable that, in the past, this and *B. chilense* have been treated as a single species as they differ substantially.

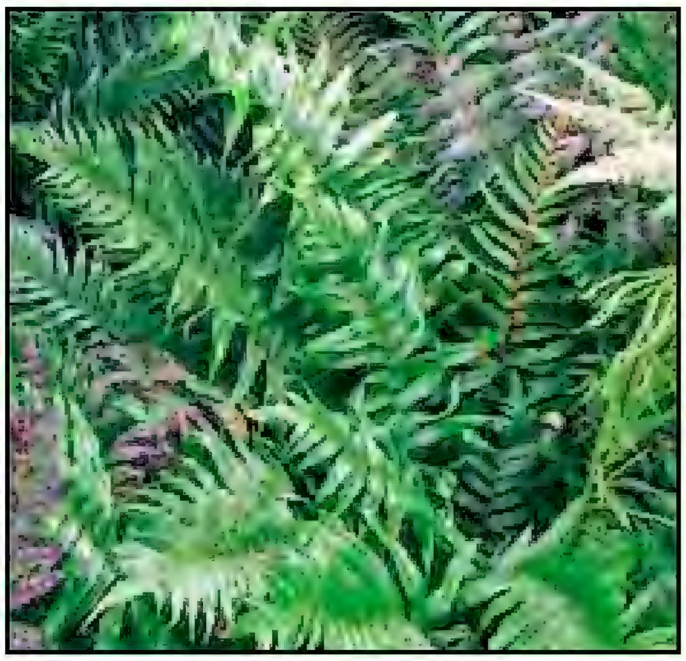

Fig. 7. *Blechnum magellanicum*

Blechnum tabulare

The least hardy member of the group, young plants of this species will struggle to survive an average UK winter without protection. Even large plants lose their fronds through moderate winters and are slow to recover. With protection, young plants grow quickly but will not produce trunks for many years. However, trunkless specimens make extremely handsome ferns with 60cm fronds.

Compared to *B. magellanicum*, the pinnae are broader, fewer and more widely spaced. The fertile fronds also have fewer pinnae, and the scales are ginger rather than black. In the past, plants as diverse as *B. chilense* and *B. magellanicum* have been included in *B. tabulare*. This is perplexing as the plants are clearly morphologically and geographically distinct. The name is now restricted to plants from Africa and islands in the Indian Ocean (Fig. 8).

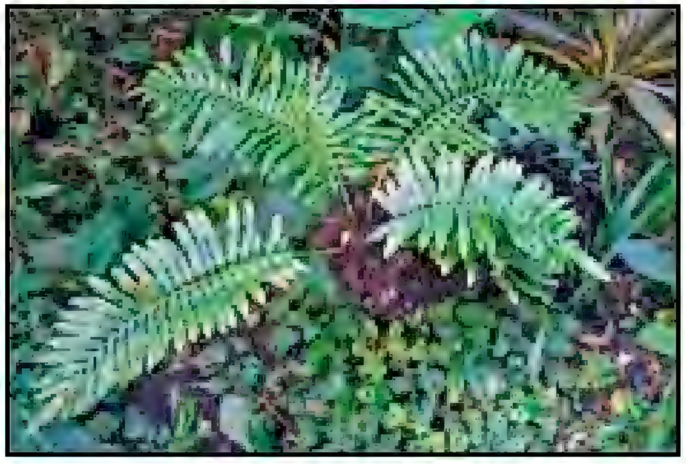

Fig. 8. *Blechnum tabulare*

Blechnum cycadifolium

This species is endemic to the Juan Fernández Islands off the west coast of Chile. Large plants there form magnificent colonies at higher altitudes, both in shade and in the open. It has recently become available in horticulture and is proving to be fairly hardy in sheltered gardens (Fig. 9.). Ensoll & Hughes (2007) describe its cultivation at Royal Botanic Garden Edinburgh and at Logan Botanic Garden on the west

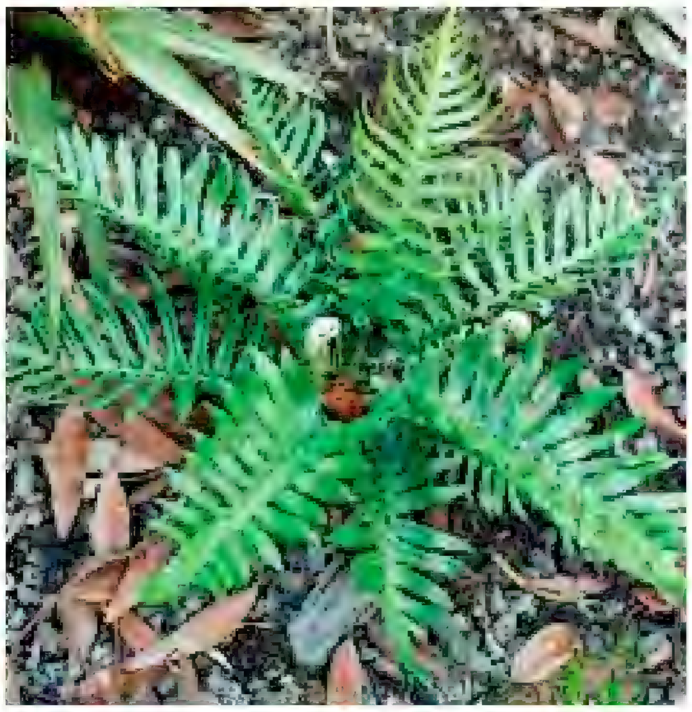

Fig. 9. *Blechnum cycadifolium*

coast of Scotland. A plant in my garden in Essex is slow and remains small, so higher rainfall and humidity may be beneficial.

This species resembles *B. magellanicum* but has shorter fronds to 100cm. The young fronds are densely scaly on the lower surfaces and the scales are bright golden-brown. If this species proves to be consistently hardy it will become a wonderful addition to British gardens.

Blechnum palmiforme

Very recently introduced, this exciting species from Tristan da Cunha and nearby islands in the southern Atlantic Ocean is showing great promise in Scottish gardens. It has proved cold-hardy through recent winters in Scotland (J. Taggart, pers. comm.). Taggart (2009) gives an excellent account and description of the fern, including details of its native habitat and introduction to Scotland.

It resembles *B. cycadifolium* but has shorter pinnae and blunt fronds reaching 80cm in length (Fig. 10.).

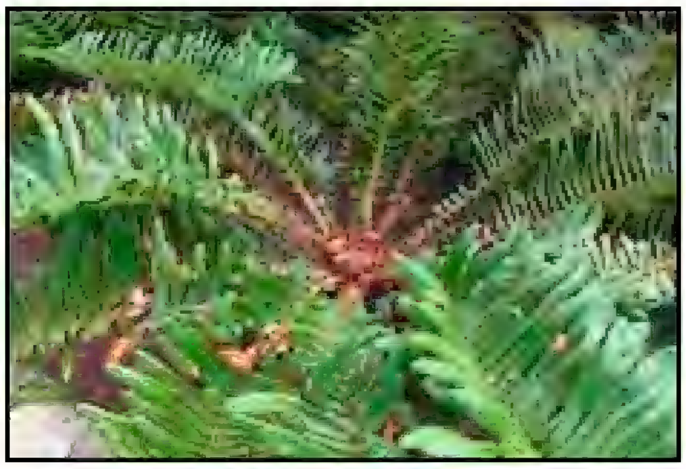

Fig. 10. *Blechnum palmiforme*

Blechnum nudum group

Species in this group are medium-sized ferns native to Australia and New Zealand that can produce short trunks in humid habitats. In the UK, trunked crowns are liable to be killed in hard winters but new crowns re-grow from the base.

Blechnum nudum

This species is native to eastern Australia. The fronds can reach 1m but are usually no more than half this length. The undersides of the sterile fronds are pale green and the stipes and lower part of the rachis are blackish. The fertile fronds have crowded narrow pinnae that are not expanded at the base. The scales on the fertile fronds are broad, pale and rather sparse (Fig. 11).

It is a very attractive species producing many fronds each summer that are only lost in the harshest winters. In the UK plants tend to form large clumps, but in more favoured areas huge colonies can develop, as for example in the Parque da Pena, Sintra, Portugal.

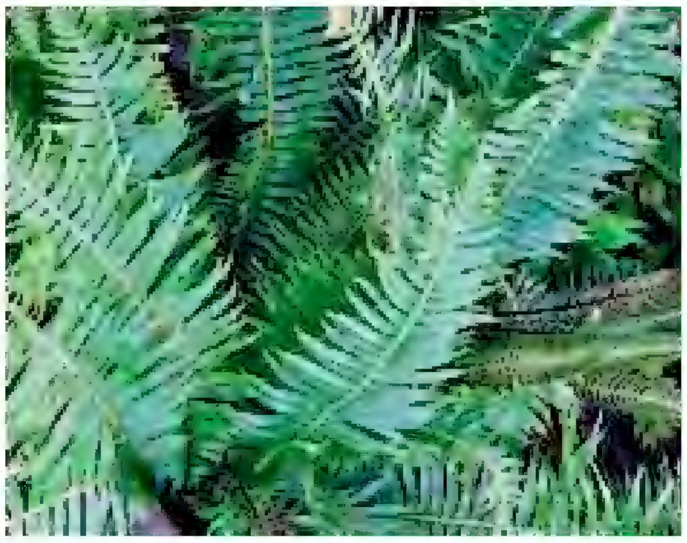

Fig. 11. *Blechnum nudum*

Blechnum discolor

This the New Zealand counterpart of *B. nudum*; they have been confused in the past although they are quite distinct. *Blechnum discolor* forms well-defined shuttlecocks and the frond lower surface is very pale, sometimes almost whitish. The sterile pinnae are broader and their apices are more obtuse. The fertile fronds are even more distinctive: the lower pinnae being basally expanded at the rachis giving a unique and readily recognized appearance. The ginger scales on the fertile fronds are hair-like and relatively abundant (Fig. 12).

When well-grown this is one of the most beautiful ferns. However, it can lose fronds in moderate winters and this will prevent plants reaching their full potential.

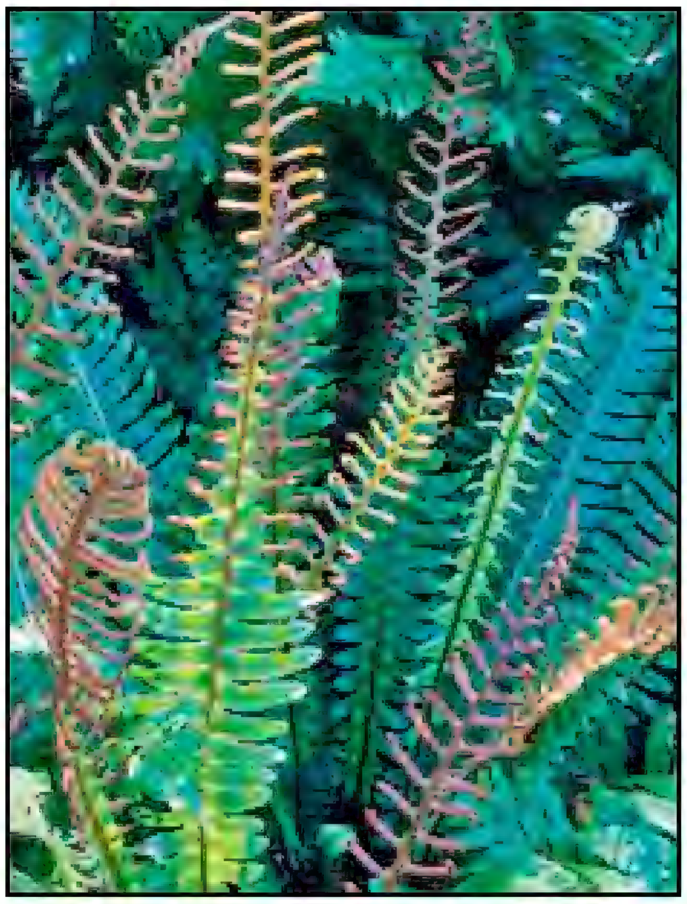

Fig. 12. *Blechnum discolor*

Blechnum spicant group

The well-known UK native hard fern belongs to this group. In both species the sterile fronds are spreading and gradually narrow towards both ends. The sterile fronds are narrow and erect.

Blechnum spicant

This beautiful evergreen species often carpets woodlands, stream banks and rocky gorges in the west and north of the UK. Even in the drier southeast it grows well in sheltered woodland. It is native throughout Europe and western Asia, and also western North America. Hard fern makes a wonderful garden plant given sheltered, acidic, conditions and can eventually form large clumps (Fig. 13).

The fronds are dark green and up to 5cm wide, while the fertile ones are longer than the sterile, reaching about 45cm in length.

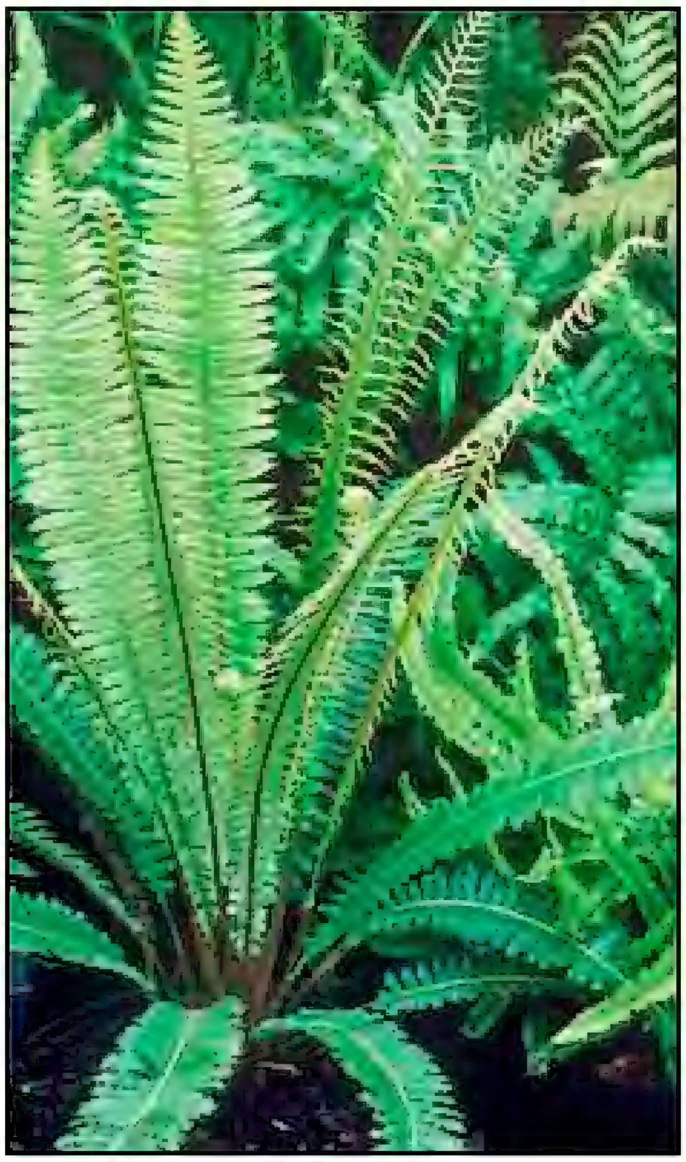

Fig. 13. *Blechnum spicant*

Blechnum niponicum

This Japanese species is closely related to *B. spicant* but has broader sterile fronds, up to 10cm wide and 40cm long. The new fronds are heavily tinged pink and mature a paler green than those of *B. spicant* (Fig 14). This is a very attractive species but remains small in my garden.

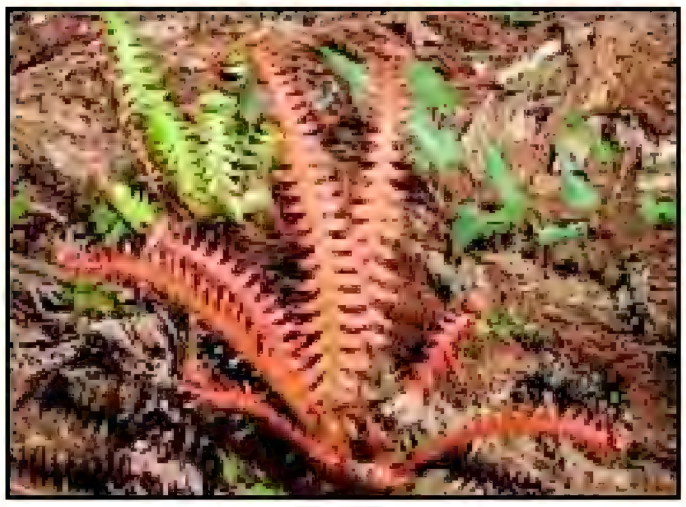

Fig. 14. *Blechnum niponicum*

Hardy *Blechnum* in Cultivation

Blechnum australe group

Species in this group occur in South Africa and South America. They have creeping rhizomes that can form substantial colonies. The fronds reach about 40cm in length and are pinnate at the frond base with the pinnae gradually becoming adnate towards the apex. The pinnae are falcate, basally expanded and gradually reduce in size towards the frond base. The pinnae margins are minutely denticulate.

The close relationships between the species can cause problems with identification. Typical *B. australe* and *B. hastatum* are distinct, however *B. australe* subsp. *auriculatum* is somewhat intermediate.

Blechnum australe

The typical subspecies, subsp. *australe*, is native to southern Africa. The fronds are dimorphic, and it is the most attractive fern in this group as the young fronds are tinged with pink and orange.

The South American variant, subsp. *auriculatum*, is found in eastern South America from south Brazil to Argentina. It approaches *B. hastatum* in some characters but the fronds are somewhat dimorphic. It is not as attractive as subsp. *australe* because the new fronds are green (Fig.15).

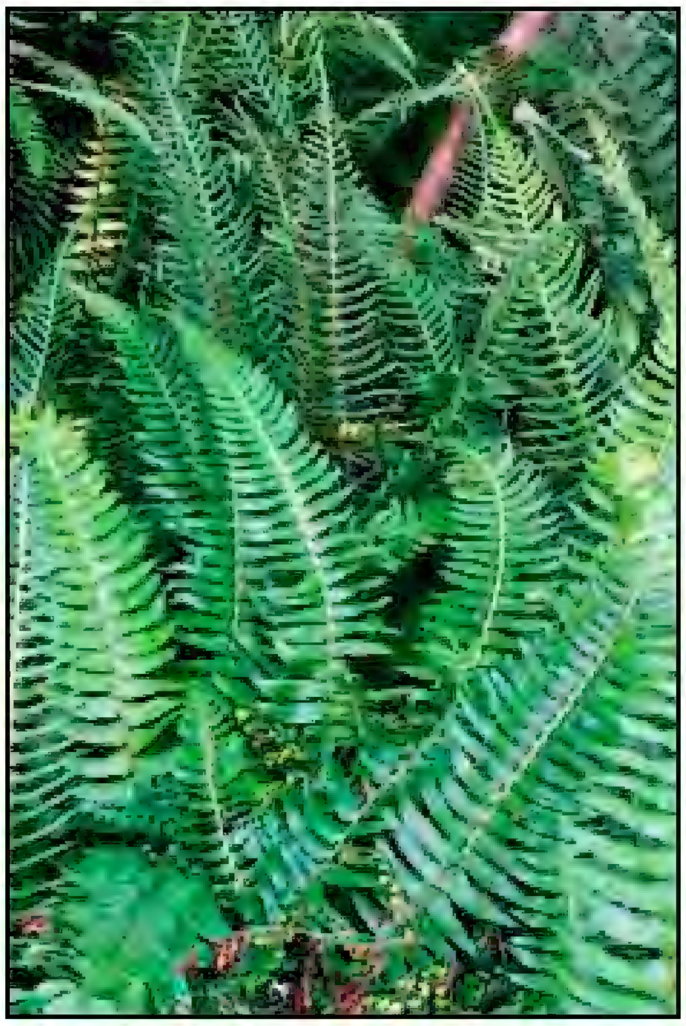

Fig. 15. *Blechnum australe* subsp. *australe*

Blechnum hastatum

This species is from western South America, mainly Chile but also Argentina. The most obvious diff-erence from *B. australe* is the almost monomorphic fronds: the fertile ones have broad areas of sterile tissue bordering the indusia. The new fronds are green and the broad pinnae help create an attractive ground cover. This species seems hardier than *B. australe* and the fronds remain wintergreen at low temperatures.

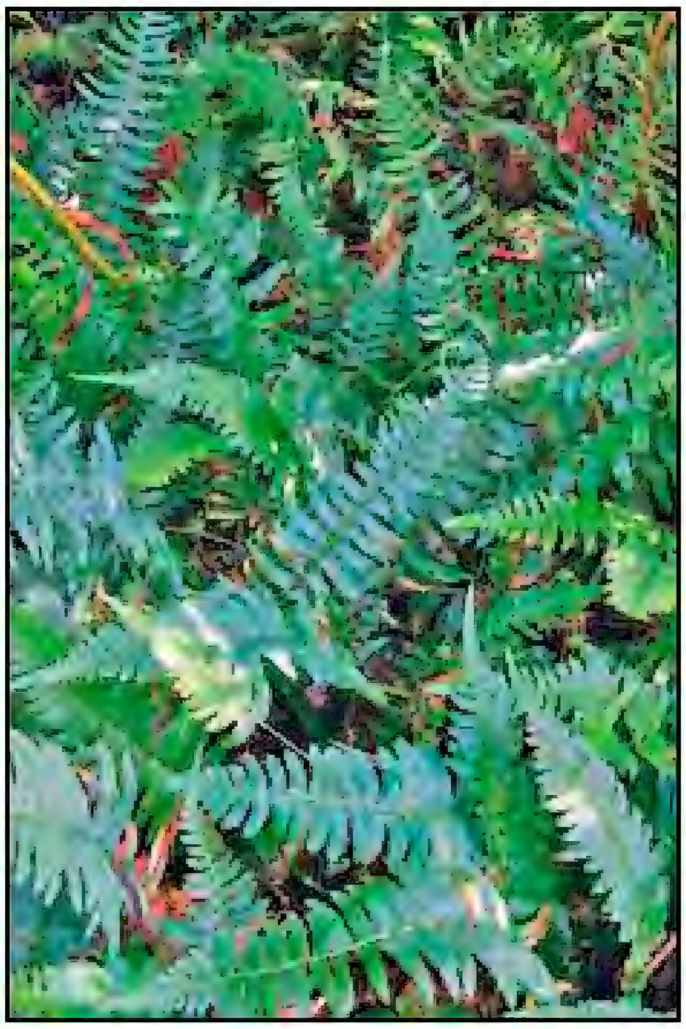

Fig. 16. *Blechnum hastatum*

Blechnum penna-marina group

These species are low-growing with strongly creeping rhizomes forming large patches. The narrow fronds are strongly dimorphic, sparsely scaly and taper towards the base. The pinnae are sessile.

Blechnum penna-marina

This species is well-known in cultivation and widely available. It occupies a cool temperate range in the southern hemisphere. Its taxonomy has recently been revised (Chambers & Farrant 1996) and divided into four geographical subspecies, two of which are commonly grown.

Blechnum penna-marina subsp. *penna-marina* (Fig. 17) is native to South America and some South Atlantic islands. It has pinnae that tend to overlap and the stipe is dark purplish-black with this colour extending into rachis. This subspecies tends to be one of the tallest, with fronds to 30cm long. They are less glossy than those of subsp. *alpinum* and the pinnae are usually rounded at the apex.

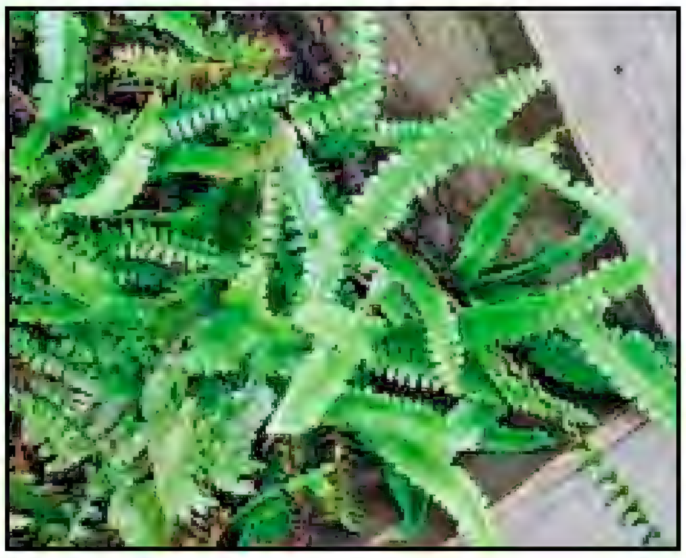

Fig. 17. *Blechnum penna-marina* subsp. *penna-marina*

Blechnum penna-marina subsp. *alpinum* occurs throughout most of the range of the species and is the only subspecies found in Australasia. Its pinnae tend not to overlap and the stipe is dark reddish brown at the base and greenish below the rachis. It is low growing and quite dwarf. The fronds are 10–20cm long, have a glossy sheen, and the pinnae tend to be shortly pointed (Fig. 17).

Both subspecies make attractive groundcover with reddish or purplish young fronds but can be invasive, especially on peaty soil.

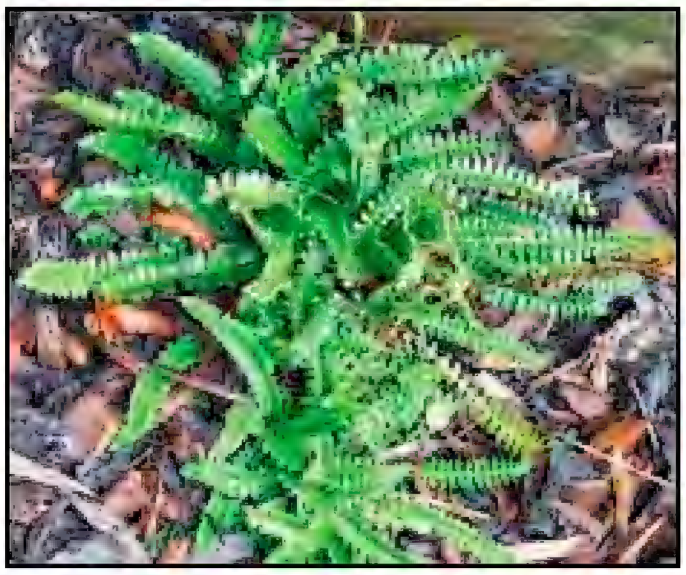

Fig. 17. *Blechnum penna-marina* subsp. *alpinum*

Blechnum microphyllum (syn. *B. gayanum*)

Chambers & Farrant (1996) consider this to be a subspecies of *B. penna-marina*. However, in cultivation it is very distinct and I prefer to treat it as a species. It is a delightful, well-behaved, miniature species, slow growing with short rhizomes and orange new fronds. The pinnae are narrowed at the rachis and strongly toothed. The fronds are usually no more than 15cm long (Fig. 18).

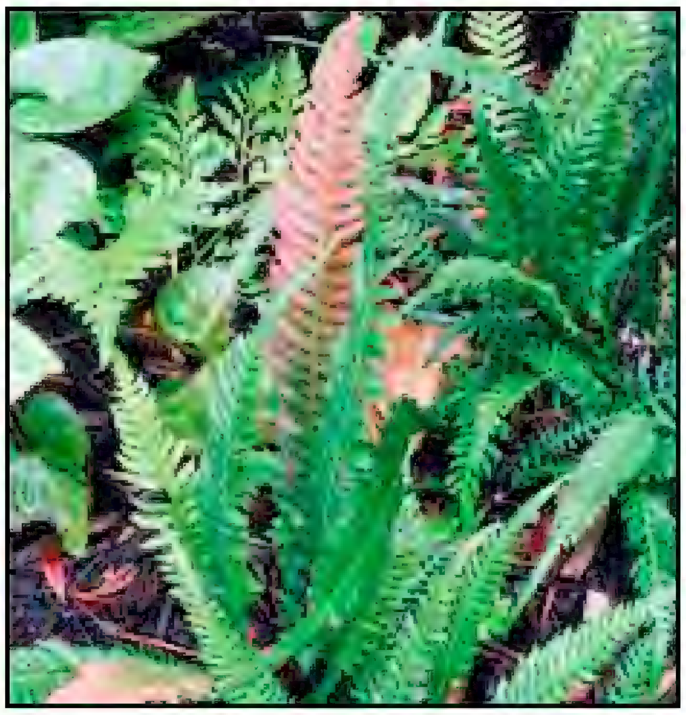

Fig. 18. *Blechnum microphyllum*

Hardy *Blechnum* in Cultivation

Blechnum mochaenum

This quietly attractive rhizomatous species from south Chile and Argentina slowly creeps among other plants. The rhizomes do not form dense mats and tufts of fronds will arise, scattered around the original planting. The fronds, purplish when young, taper towards the base where the lowest pinnae form semi-circular flanges along the rachis. The pinnae are strongly adnate. The fertile pinnae are long, narrow and strongly falcate. The species seems hardy although fronds can be scorched in winter. Two varieties are recognised and both are in cultivation.

Blechnum mochaenum var. *mochaenum* is from mainland South America. Its fronds are rather thick and glossy and reach 35cm in length. The stipe is relatively stout and at least 1mm in diameter (Fig. 19).

Blechnum mochaenum var. *fernandezianum* is from the Juan Fernández Islands. The fronds are smaller, to 15cm long, and of a thinner texture. The stipe is under 1mm in diameter.

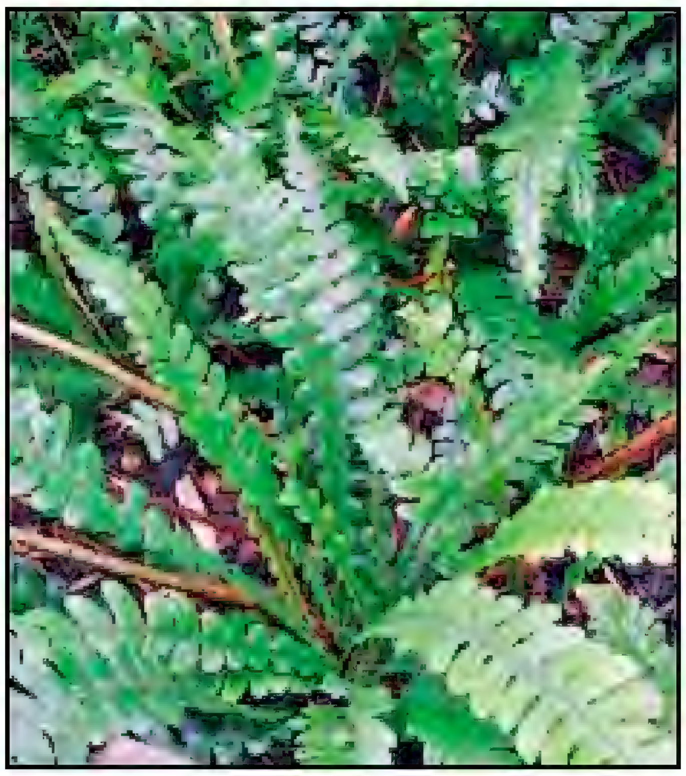

Fig. 19. *Blechnum mochaenum* var. *mochaenum*

Other species

Blechnum chambersii

The rhizome of this species is erect, giving rise to a rosette of sterile fronds to 35cm in length that spread horizontally. The pinnae are slightly falcate, strongly veined and sharply toothed. The fertile fronds are erect, around the same length as the sterile ones, with very narrow pinnae (Fig. 20).

It is native to forested areas of south-east Australia and New Zealand. Subtly attractive, the dark green, glossy fronds stand out among other ferns. It is particularly suited to damp, shaded areas.

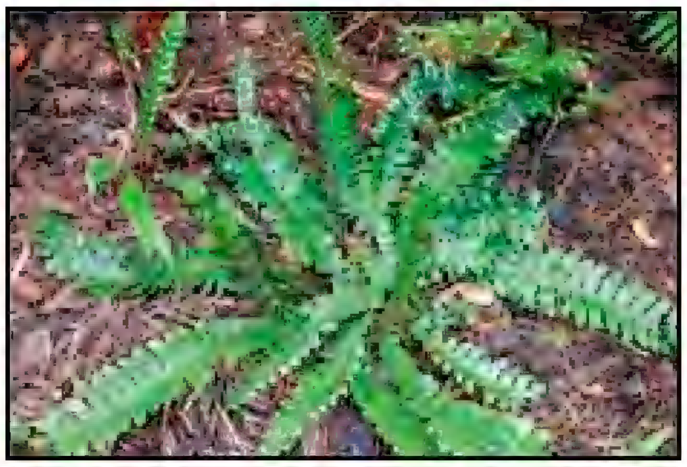

Fig. 20. *Blechnum chambersii*

Blechnum fluviatile

This wonderful species is a personal favourite. It is native to New Zealand and southeast Australia and, despite growing naturally on wet stream banks, is easy to grow in a shady spot that does not dry out. Older plants may produce short trunks. The narrow, horizontally spreading, sterile fronds to 40cm long are furnished with rounded, dark or apple green pinnae. These contrast beautifully with the dark rachis which is densely coated with spreading black scales. It is fascinating to watch these fronds, resembling large hairy caterpillars, gradually unfurl over a couple of days. The fertile fronds are very narrow and erect. Shortly rhizomatous, it will slowly form a colony.

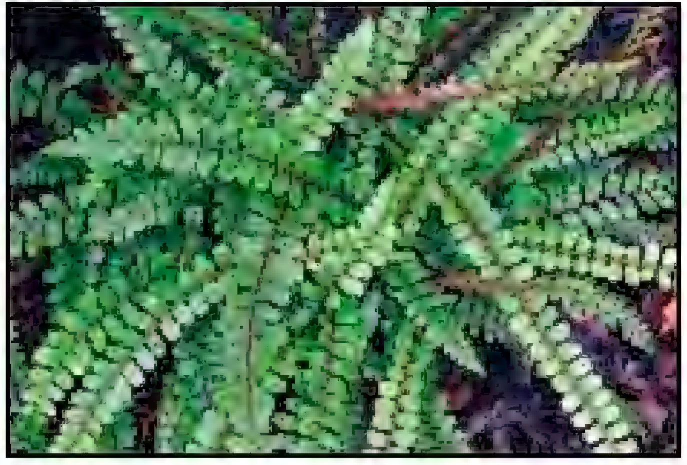

Fig. 20. *Blechnum fluviatele*

Cultivation

Blechnums prefer high rainfall and humidity and will grow best in such situations. They can only grow well in drier areas if irrigated, but then will not attain the size of plants growing in ideal conditions. Acid to neutral soils are essential and plentiful organic content is beneficial. Most species prefer shade, however those with colourful new growth often produce more intense tones in bright light.

Most species remain wintergreen above -5°C. Some will lose their fronds at lower temperatures but generally recover quickly the following summer. Dead and damaged fronds are best removed in the spring to allow colourful new growth to be clearly visible. Exposed trunks of some species are vulnerable to drought in summer and cold in winter. A mulch around exposed trunks is beneficial under both conditions.

Propagation by spores can be slow or erratic (Olsen 2007). Species with creeping rhizomes can be easily divided in spring or early summer.

Conclusion

Blechnums display a combination of dramatic, colourful young fronds against a backdrop of dark green mature foliage. This allows them to be considered an essential component of gardens where structure, form and foliage effect is a priority.

My selection of species here is inevitably rather subjective and additional species are certainly grown in British gardens. I would be grateful to receive further information on their performance.

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Growing Ferns in Limited Space; Some Ideas for Beginners.

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If you are anything like me and you keep ferns in a greenhouse then you've most likely run out of bench space. Or if you've just got a small garden or yard with not much soil, a situation I've encountered myself in the past, then that is problematic too. There are several remedies:

1. Don't have any more ferns – well that's clearly a non-starter else you wouldn't be reading this!

2. Give some of your less interesting ones or any duplicates away to friends or donate to BPS to sell and make more space for yourself; the problem with this strategy is that you will probably buy some back! I'm all for this though as a regular recipient myself.

3. Grow ferns in pots and containers – you might say well they take up as much space but if you want to make use of a patio or boring hard landscaping you can green it up in no time at all. Just make sure you've some nice deep saucers for water capture in the warmer months and you keep the pots well fed. For display I think terracotta pots look best but they need to be kept well watered (Fig. 1.).

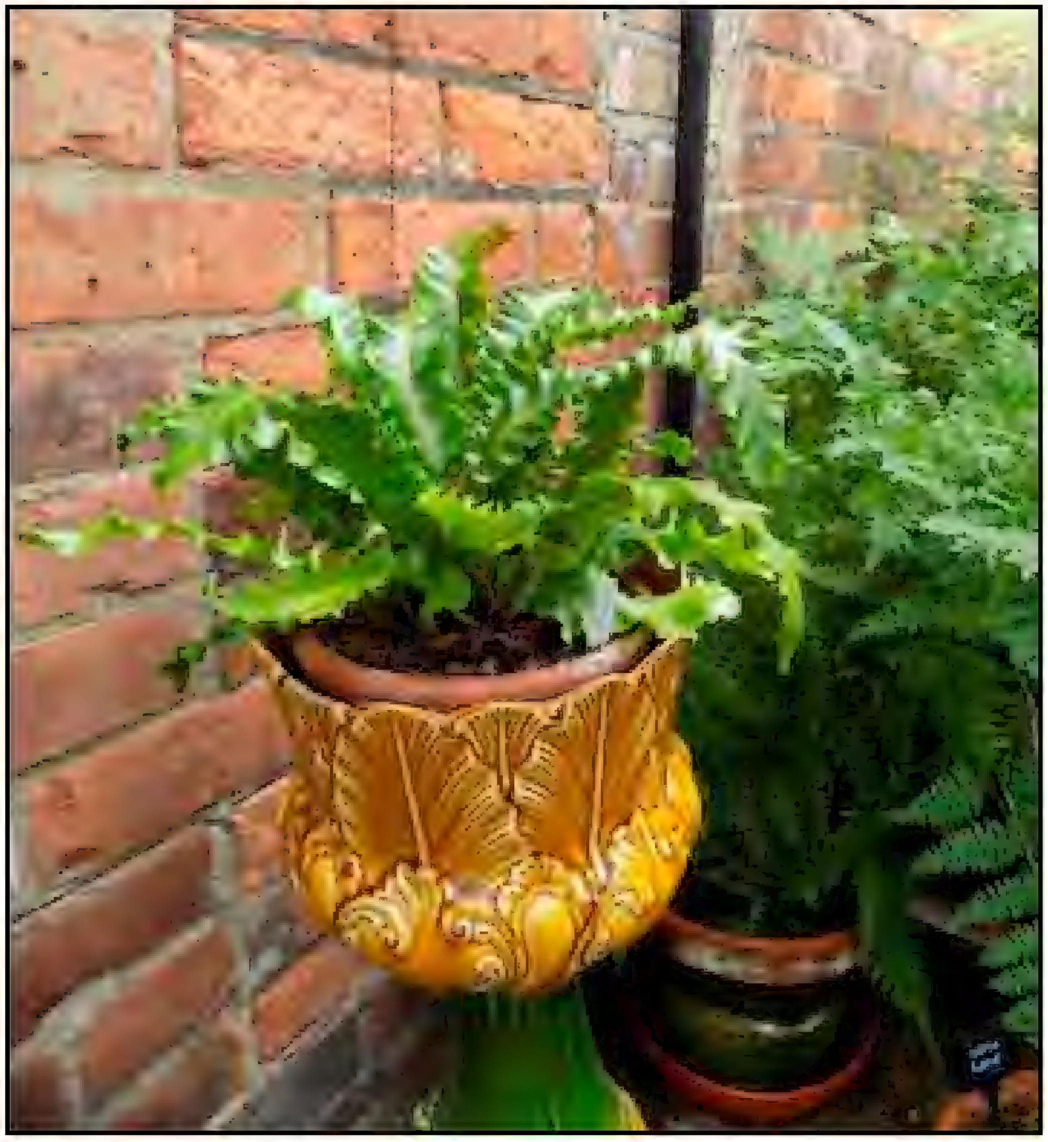

Fig. 1. Ferns in pots

4. Get three dimensional – stack your pots. You can buy fancy stacking stands or utilise an outside bench or garden chair by placing shade-loving shorter ferns under the bench and showy taller ones on the seat. What's the point of a bench that is only rarely sat upon? In my current garden I've got a metal see-through rocking bench. I do use this to sit on in the summer but I've placed in on bricks actually in the edge of the fern bed so my feet dangle on the lawn and planted small spreading ferns such as *Blechnum penna-marinum* and *Adiantum pedatum* under the seat so I can sit and rock and look down at the ferns growing beneath me as well as those growing around me. This is very therapeutic especially if you are feeling a bit poorly or need a rest from gardening Fig. 2.).

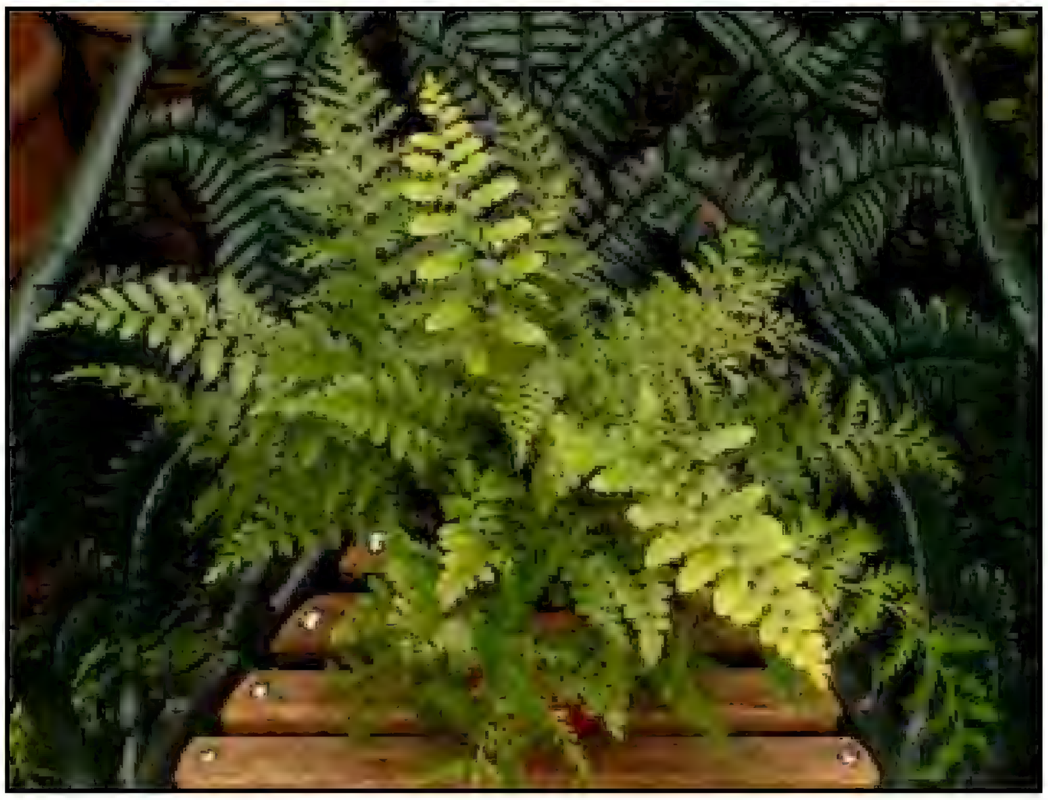

Fig. 2. Ferns stacked on a seat.

5. Another idea which I haven't put into practice myself yet is to make a stacking frame out of old pallets leaving space between the planks to let light through. A bit like you often see in nurseries. Shade loving ferns can be put on the bottom either directly planted or sitting on the soil, in saucers if in pots on paving or on a lower shelf, placing other taller ferns on the top. This would make a low-cost, rustic looking display say up against a shed or an uninteresting wall.

6. Speaking of which if your uninteresting wall is north-facing you could attach ferns in wall baskets (Fig. 3.) or you can buy these custom-made contraptions. The issue here is watering and occasional feeding, slow release feed would be useful in this situation. At Hull University a very boring multi-storey car park has been built but on the north side is a living wall of ferns and other evergreens. Pteridologist article Alison Paul? It looks fantastic and lush but it is aided by an automatic watering system. Dick Hayward (pers comm.) has a good solution for using greenhouse space. He has covered the walls of his greenhouse with a stout

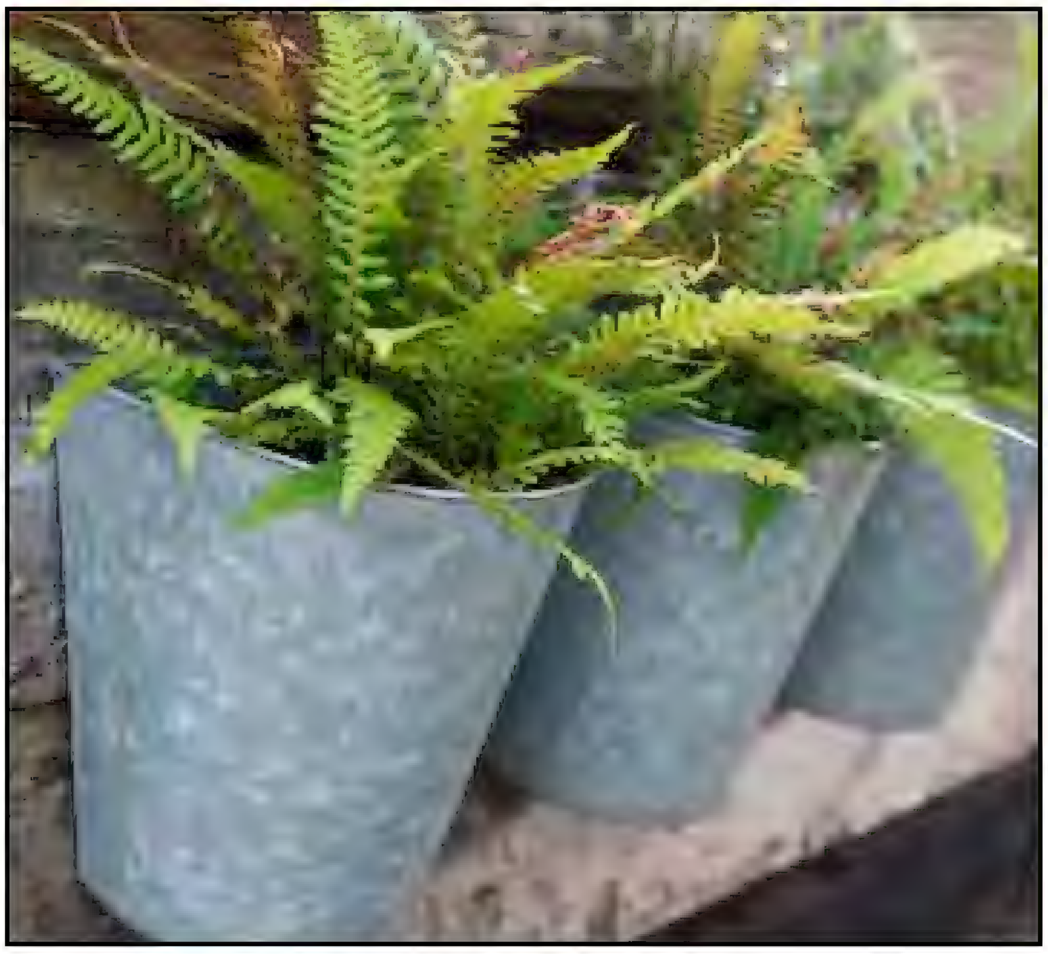

Fig. 3. Ferns in hanging baskets

open wire mesh grid from which he hangs wall baskets made of natural materials. This is a great use of space above the bench.

7. You can make a nice display of ferns in pots in a corner or against a wall by mounting the back ones on upturned containers, crates or terracotta pots of different heights. Terracotta pots are best as they are stable and do not detract from your display, just remember to use decent-sized saucers which you can fill with water in the summer months. I do this in the corner of my drive up against one of the garage doors; well who uses their garage to put their car in anyway? I use the ferns as a nice green backdrop to show off pot-grown lilies or fuschias when they are at their best in the summer.

8. If you've got tree ferns attach epiphytes (ferns that grow on other plants) onto the trunk. You can attach with wire or strong thread and keep spraying with rainwater. Outside many of the hardy Aspleniums and Polypodiums will take to this. Inside a world fern flora of epiphytes is at your finger tips: Davallias; Pyrrosias; Microsorums……next time you go to Kew or Edinburgh Botanic Gardens have a look and see what they have growing on tree ferns in the glasshouses.

9. What about growing ferns in odd or novelty containers. I was given a piece of pottery which I call my Tolkienesque pot; my friend Steve made it at pottery classes. I kept it empty for a while and then decided to grow a range of Davallias in its various crevices (Fig. 4).It's got *D. pyxidata* (from Fibrex) growing out of the top with other bits of Davallia species in the various pockets. The upright rhizomes of the *D. pyxidata* are growing well in the top and the other Davallias are spreading their rhizomes around the pot. It just needs an occasional feed and it won't get out of hand. It's totally unique. When I moved to Buxton I inherited an aluminium full-sized bath; I can't think why the owners didn't want to take it to Australia! A bath only has one drainage hole but it is perfect for ferns that like damp conditions like Osmunda. So my bath now has a selection of Osmunda of different species which are growing well, maybe too well (Fig. 5.). It is placed up against a boring shed which a lightly shaded spot at the end of the garden. I'm also trying to nurture an understorey of lily of the valley which will look good before the fronds totally unfurl.

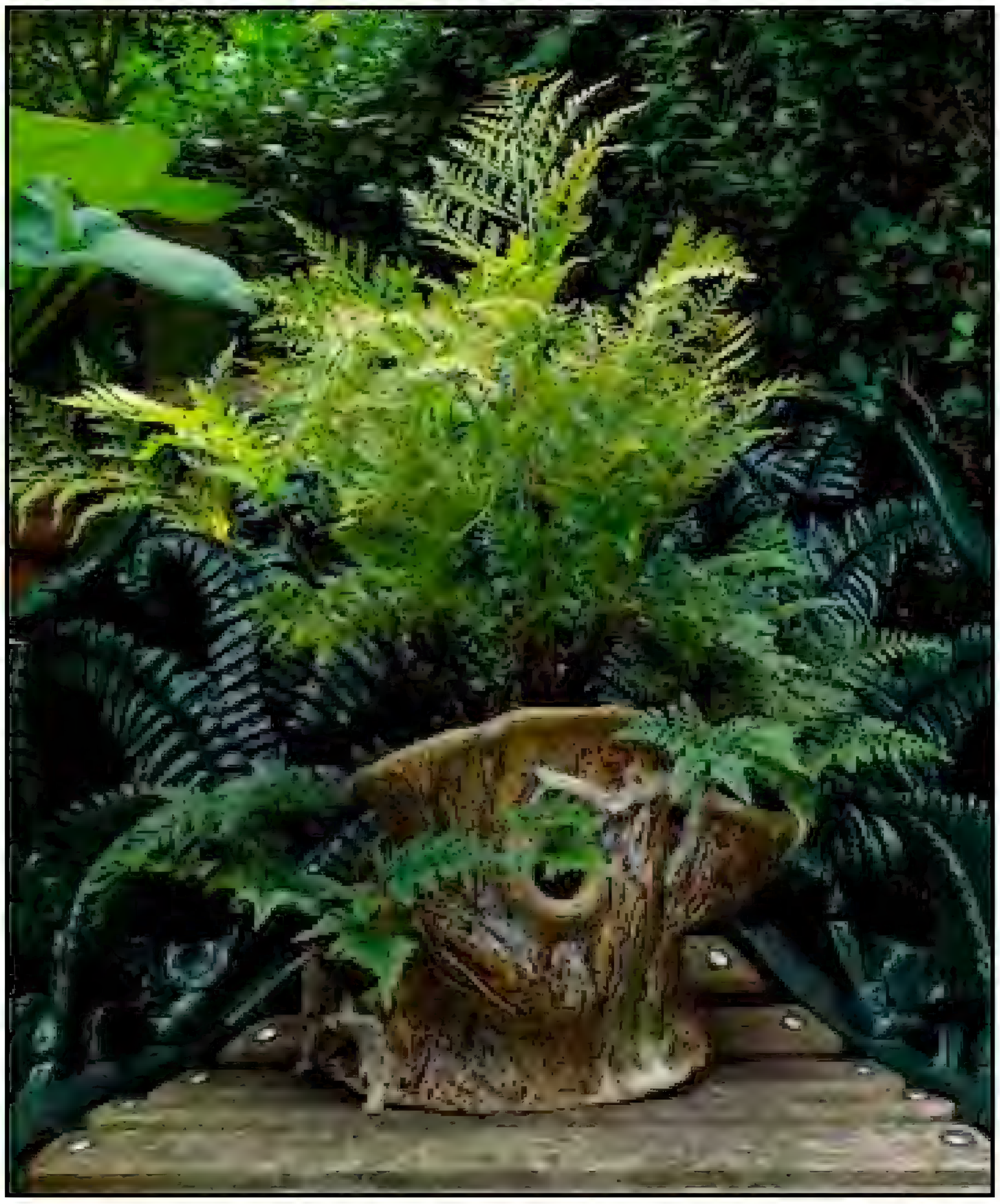

Fig. 4. The Tolkienesque pot with a range of Davallias

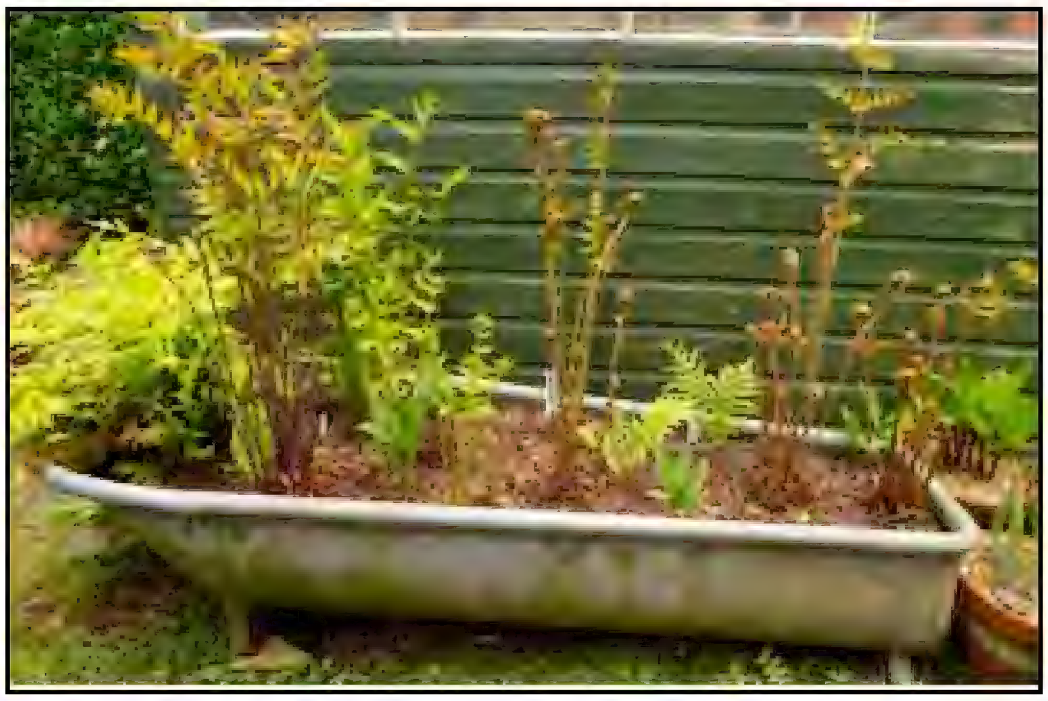

Fig. 5. Osmundas in an old bath

10. Why not grow a mix of ferns in a single container? You could be taxonomically correct and use ferns of the same genus, or geographically correct and use ferns that come from the same area such as Macronesia or the Balearics or Japan …….in our corridor at Thwaite Botanic Gardens greenhouse there is an ugly drain cover on which I have put a large container planted with *Lygodium japonicum* climbing up a support in the middle along with *Coniogramme japonica* and *Onychium japonicum*. Or what about an ecological mix of ferns that like the same conditions such as mountain species or xerics in a sink (Fig. 6). Currently outside I'm trying a calcareous sink with chunks of limestone hosting *Cystopteris fragilis*; *Asplenium scolopendrium*; *A.ceterach*; *A. trichomanes* subsp *quadrivalens*; *Gymnocarpium robertianum*. Also an acidic sink garnished with slate growing *A. trichomanes* subsp *trichomanes*; *A. septentrionale*; *Cryptogramma crispa* and a lovely tiny Blechnum given to me by Julian Reed. Or you could just be artistic and put some ferns together that look good complementing each other.

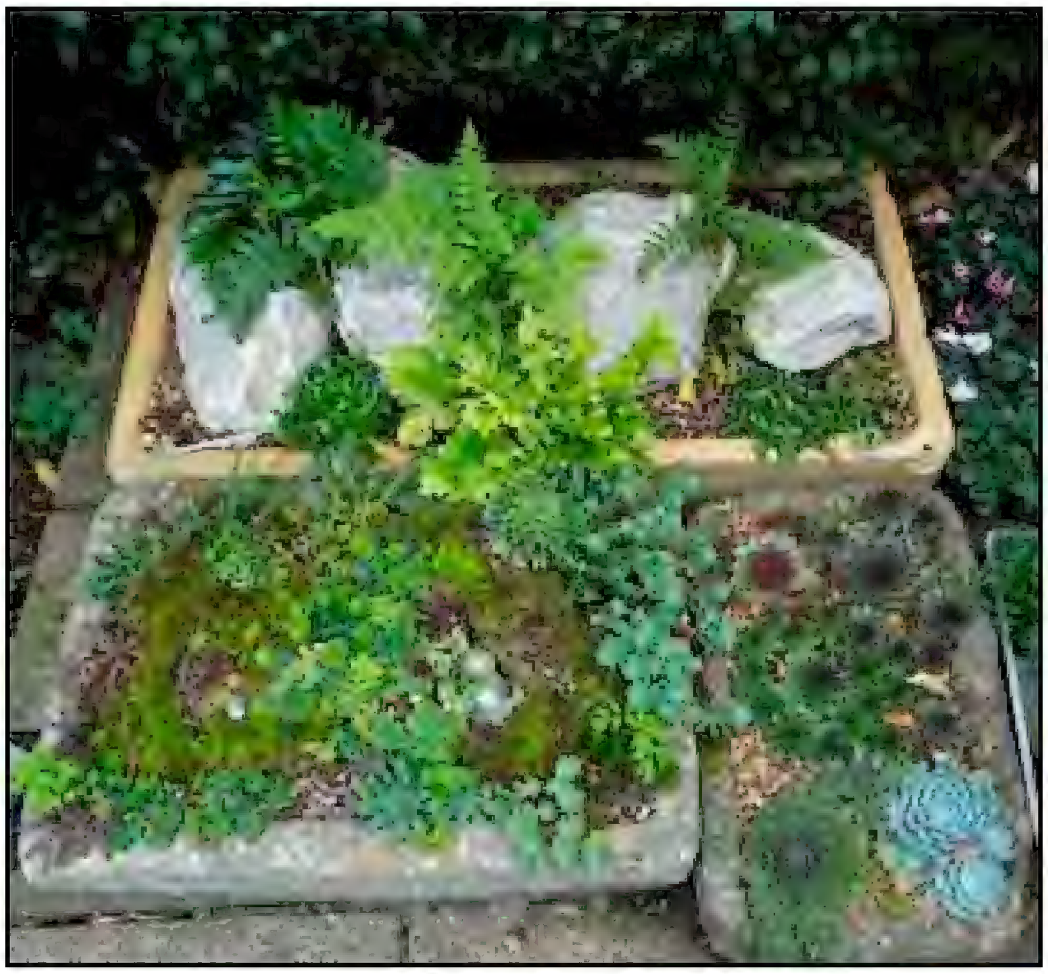

Fig. 6. Ferns grown in sinks

Growing Ferns in Limited Space

When we moved into our current house there was an ugly car port with a dirty see-through plastic roof attached to the side of the house. My first thoughts were to get rid; it didn't happen immediately and I began to see that ugly it may be but it did create a micro-climate. Even in winter it rarely goes below freezing. You can see where I'm going with this. So a large deep wooden planting trough was placed against the house wall under a gap in the roof where the rain comes in (Fig. 7.). This was planted with ferns which wouldn't grow that well out in my garden notably Lophosoria which grows well in Logan Botanic Gardens but not so happy in east Yorkshire. This is underplanted with Arachniodes species; Pellaea and various bits of garden centre ferns which do not thrive as house plants but which are happy in the car port like various Adiantums.

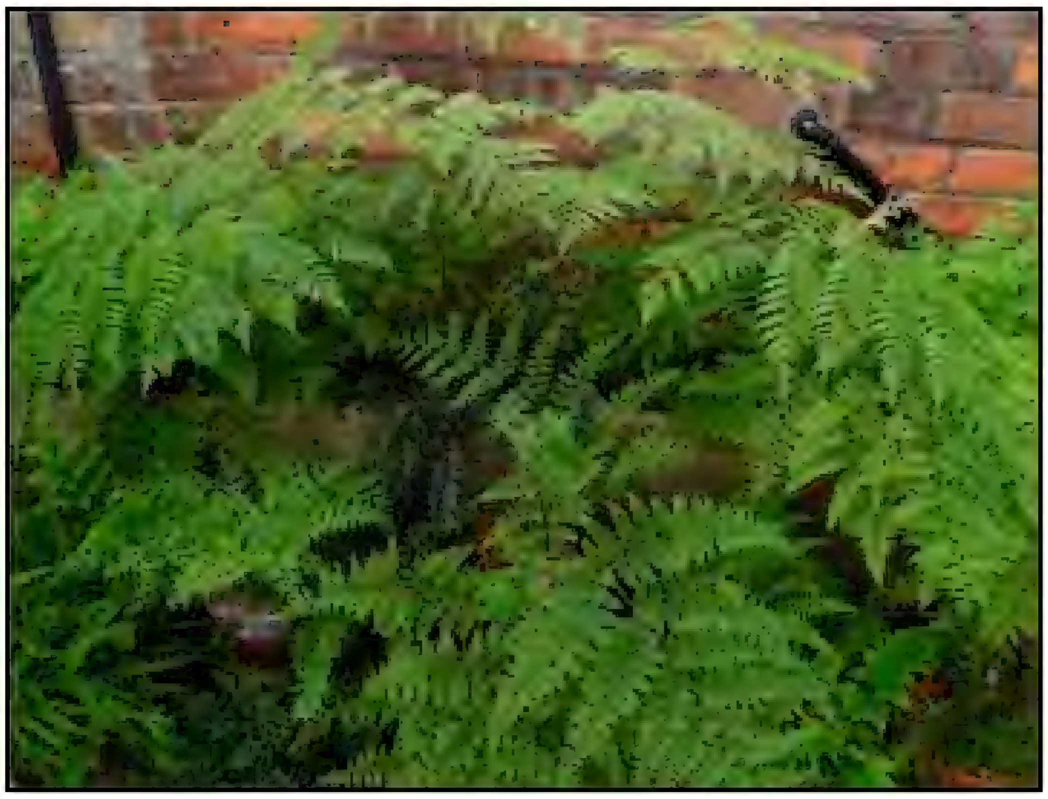
Fig. 7. Ferns in a planting trough

Speaking of growing ferns in your house; this isn't always successful as with central heating the atmosphere is often too dry but all that wasted space! An option is to grow ferns in glass cases or tanks which creates a perfect environment for growing delicate filmy ferns like Leptopteris. This has been covered by Michael Hayward in Pteridologist 2015. Victorian glazed cases are wonderful but expensive so Matt Busby in Pteridologist 2011 shows you how to make your own case and tips on looking after them. These are a fantastic use of space. You can even keep them in your kitchen!

I'll admit that my spore-growing technique is not the best. In one of my spore pots three types of *Pteris* and an *Adiantum* came up but not what I thought I had sown! But they looked good together, they'd been bought up together, they were clearly happy and I don't like throwing ferns away so I stuck them all in an old hanging basket with a missing chain.

Which brings me to another space-saving strategy, about which I'm supposed to be writing; growing ferns in hanging baskets. This is best started in the greenhouse utilising all that available height above your crowded bench. If you chose the right species you can then hang these outside in your garden either from tree branches or traditional hanging basket brackets on a shady wall or from a sheltered pagoda or timber arch in the summer months. But it is important to choose the right species to grow in hanging baskets ie any with creeping surface rhizomes which would normally grow epiphytically on other plants like palm or tree trunks or with creeping rhizomes on rocks or walls. I first saw this in Bryan Smith's garden at one of our BPS summer meetings; a beautiful basket of *Davallia mariesii* hanging from a tree branch. It looked wonderful and in the colder months it lived in his porch. So then I started growing Davallias in hanging baskets most of which seem very happy; as well as *D. mariessi* there is *D.trichomanoides*; *D.canariensis*; *D.* (possibly *Scyphularia*) *pentaphylla* and *Humata tyermanni* (this may be *Davallia* now).

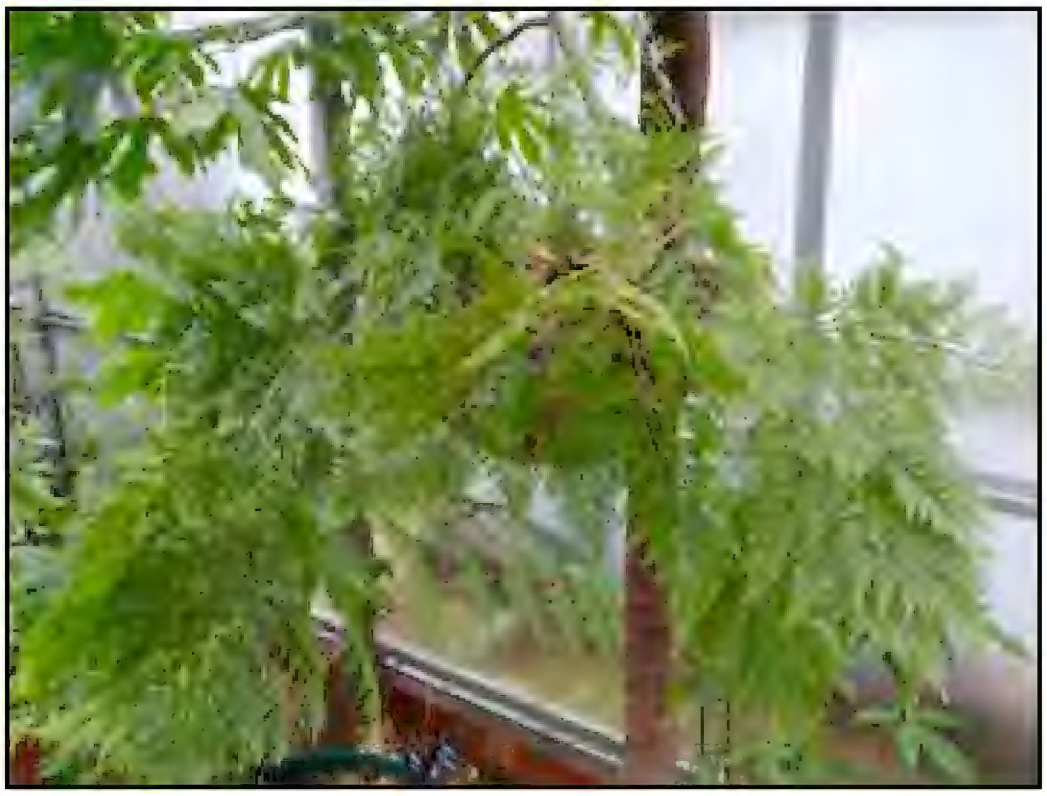
Fig. 8. *Davallia canariensis* in a hanging basket

Then on another BPS summer visit to Michael Hayward's garden I saw he had stag's horn ferns growing in baskets hanging outside from a sheltered timber frame. They looked amazing and very natural though pushing it a bit being outside up north but if you live in a maritime climate you can really push the boat out if you will pardon the pun! Needless to say I am now growing stag's horns in baskets too though they don't go outside in East Yorkshire. You can also wire stags horn ferns to pieces of wood or bark and hang them up as some orchid growers. As long as you spray them they will be fine. I've had a stag's horn growing attached to an old wooden seed tray which we hung up on a wall for display on our RHS stand at Tatton Park back in 2014. I've still got it, the tray is falling apart but the fern is very happy.

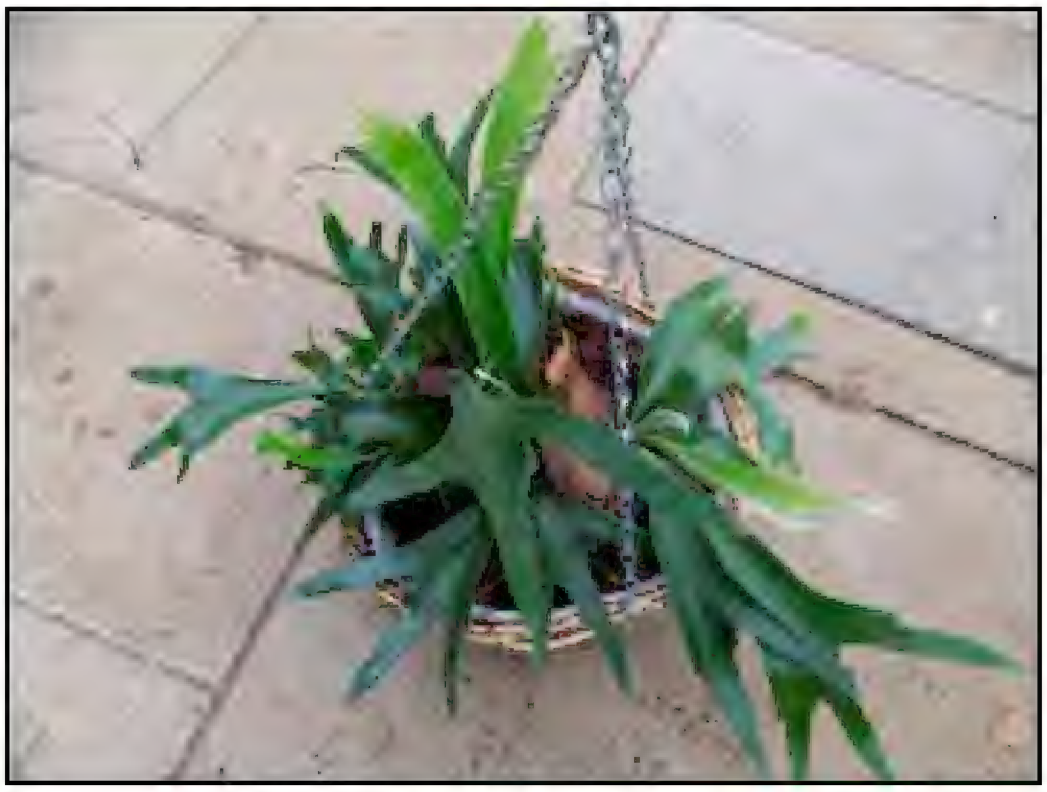
Fig. 9. *Platycerum* in a hanging basket

Another influence was seeing a photo in *Pteridologist* 2017: it was the article by Dick Hayward entitled 'Has anyone else got one?'. It was about *Aglaomorpha coronans*. Well yes, I had got one, given to me by Roger Golding and mine was growing in a terracotta pot looking quite happy but not as happy as Dick's which was a wonderful specimen growing in a basket having developed huge nest leaves at the base of the plant. So you know what I'm going to say; mine went straight into a basket where it is doing very well and in around 9 months has started to develop those large basal leaves which as Dick suggested probably means it is actually a hybrid with *A. robertsii*, notably because it has never spored.

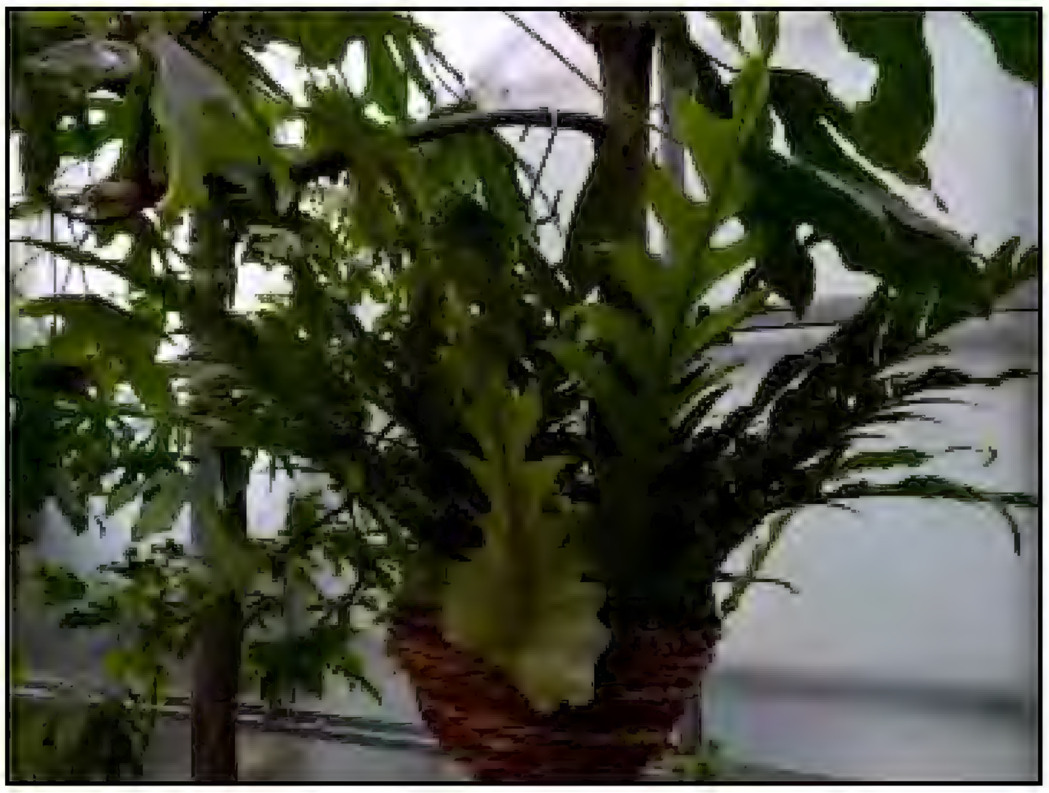

Fig. 10. *Aglaomorpha* species growing in a hanging basket

Other ferns that do well in hanging baskets, sometimes better even than in pots, are Polypodiums particularly *P. formosanum* (Fig. 11.). After a while mine didn't look good in a pot tending to die out in the middle; it looked best around the edge of the pot. So I cut out all the dead bits of rhizome and re-planted the good bits arranging them in a hanging basket where there is plenty of space for the rhizomes to grow across and encrust the outside of the basket. Sometimes you pick up the odd interesting fern in a garden centre. One such was *Microsorium musifolium* 'Crocodylus' but after a while it looked terrible in its pot and I thought I was going to loose it. So that got put in a hanging basket and now it is coming back to life. Another fern to grow in a hanging basket is Lygodium. Although a climbing fern it will also trail quite nicely and this is OK in a plastic pot. A fern I'm going to try in a basket is a piece of *Drynaria sinica* passed on to me by Julian Reed. It's so precious, originally from Tim Pyner's garden and I really do not want to risk growing it outside on the rockery as I have seen it growing in other BPS members garden further south. I have tried it before and lost it. So I think I will try a bit of that in a hanging basket in a cool greenhouse.

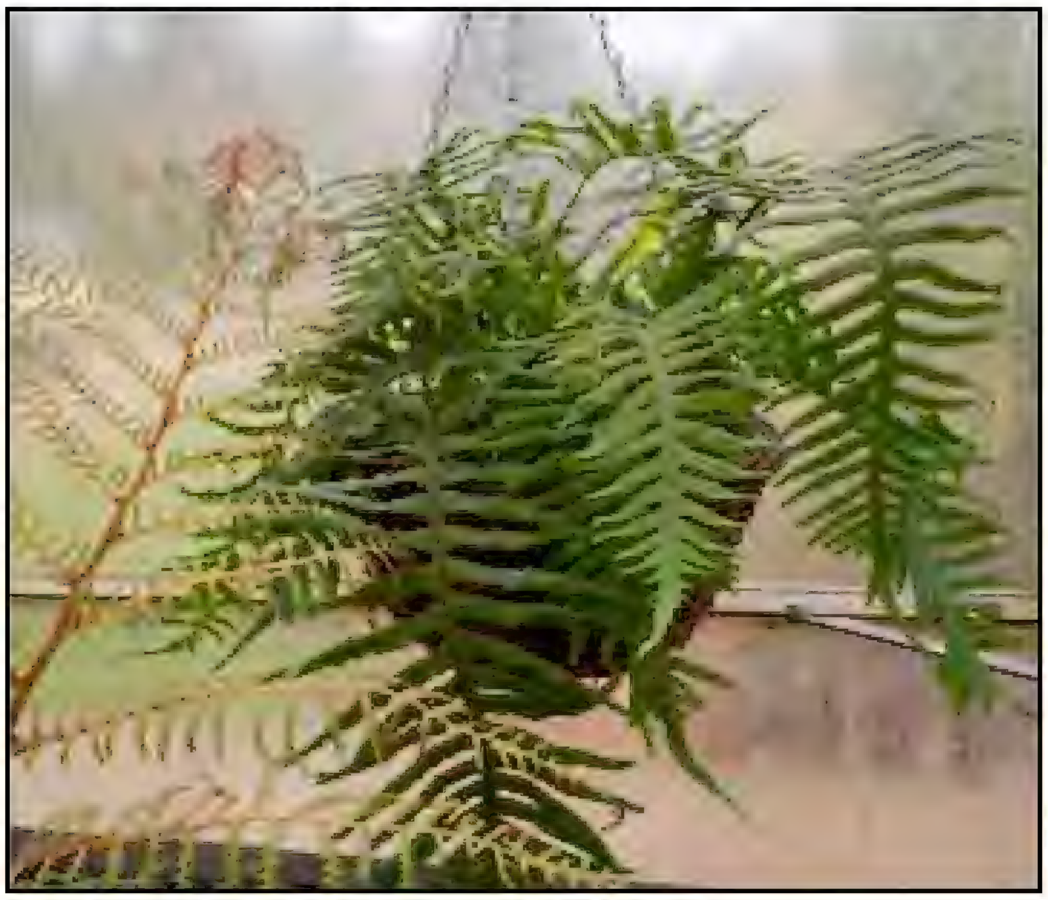

Fig. 11. *Polypodium formosanum* in a hanging basket

If you grow many ferns together in your greenhouse sometimes odd ones may pop up in your hanging baskets that you haven't planted. I'm growing *D. canariensis* in a basket and some Polypodium has appeared. Now whether this is *P. cambricum* or *P. macronesicum* I'm not sure yet but they look good together! In another basket I'm growing an insectivorous pitcher plant and a Phlebodium has popped out of the side. Personally I like this serendipity and indicates to me that the ferns are living in harmony.

How to grow ferns in hanging baskets.

Most epiphytic ferns and those with creeping rhizomes will be happy, happier sometimes, in hanging baskets rather than pots. A basket has a large surface area across the top and if made from natural materials like bamboo or coconut fibre, this gives plenty of surface area for the creeping rhizomes to adhere. If the basket is lined with plastic I would generally make a hole in the bottom unless your fern likes its feet in water. If no plastic liner you could line your basket with sphagnum which is a natural way to keep it moist.

Epiphytic ferns do not need a lot of basal feed so the growing medium would ideally be made with orchid bark predominantly with a handful or so of compost and/or sphagnum to hold a little water and perhaps a handful of acidic or basic grit mixed to aerate the growing medium depending on the ferns natural ecology. This is why you need lots of fern books! If you buy a fern from a garden centre or get given one always find out about it to determine its natural ecology. I wouldn't necessarily include any slow release fertiliser myself unless you like your ferns lush and are prepared to keep watering and splitting them frequently. Grow them hard, as in nature, but rely on spraying with rainwater and an occasional foliar feed such as Plant invigorator.

When it comes to watering apply a first drench when newly planted and then leave it until it almost dries out and continue with top spraying, again ideally with rainwater, excess will drip down into the basket. An important point about watering tender ferns is don't do as I have done in the past and water a tender fern with cold rainwater straight from the water butt; it is too much of a shock, have plenty of small cans of rainwater sitting about and water when they have warmed up to ambient temperature.

However small your space you can utilise it to grow ferns. Its fun to think outside of the box (or basket) when it comes to growing and displaying your ferns. After all they do it in nature very happily on rocks; in crevices; down drains, behind downpipes, in gutters; down wells; on roofs…..I'm sure readers have lots of other ideas about growing ferns. Do share them!

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Hayward D. (2017). Has anyone else got one- *Aglaomorpha coronans*? **Pteridologist** 2017 (6:4).

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An update on Southport Fernery

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A lot has happened since I wrote about the Fernery last year. We were working until the last minute to have everything ready for the Britain in Bloom judges last year, and they were obviously most impressed. The TV cameras were there, having previously recorded presenter Chris Bavin planting a huge *Dicksonia thyrsopteroides* (Fig. 1) with the help of David Cobham, the Chair of the Botanic Gardens Community Association

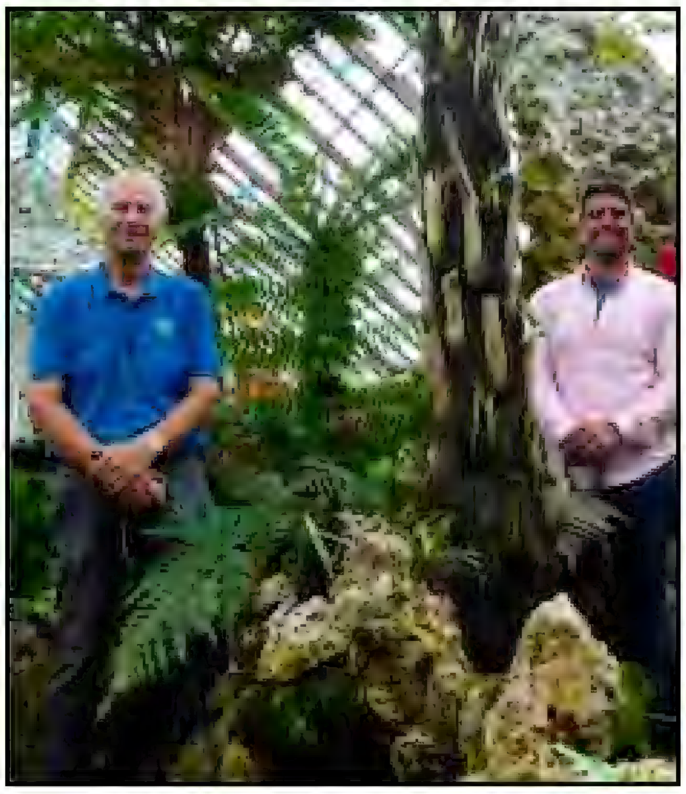

Fig. 1. David Cobham (left) and Chris Bavin (right) with *Dicksonia thyrsopteroides*

In November we were delighted to hear that the Churchtown Park and Fernery had been given a Gold medal, so celebrations were in order (Fig. 2). The Fernery featured in the BBC 2 programme on Britain in Bloom on 28th March this year, following which we had quite an increase in visitor numbers! The Fernery opened for the Summer on Good Friday, and will be open every day from 10am to 4pm until the 31st October.

Fig. 2. Celebrating the Gold Medal

The Winter months have seen a great number of improvements in the Fernery. Volunteer Maurice Ashton, with the help of Gary Mawdsley, has restored the water features so that the cascades over the central pond and the far pond are now working again, as is the central fountain (Figs. 3 and 4).

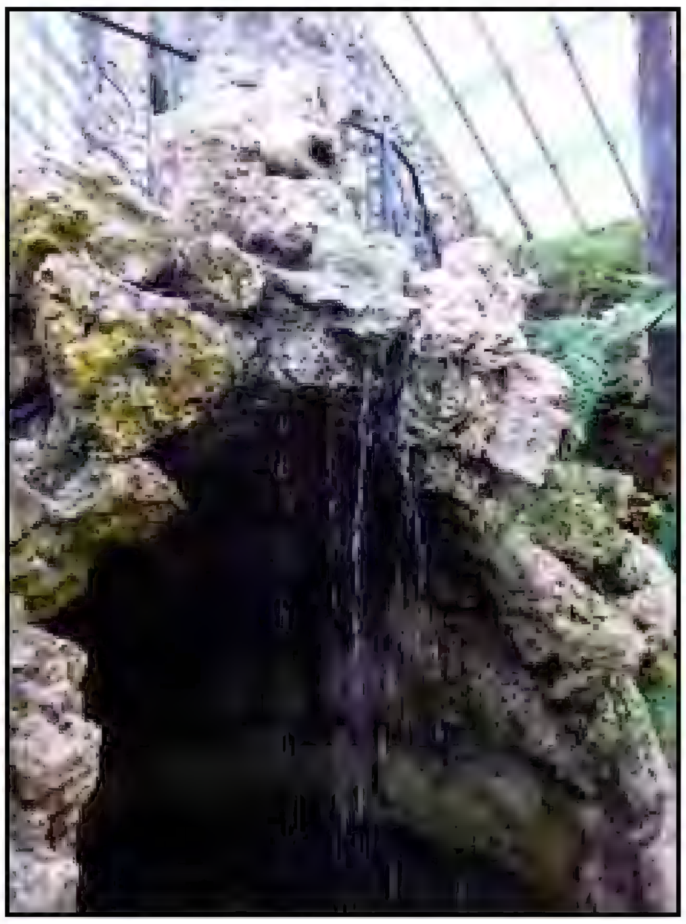

Fig. 3. Cascade over the far pond

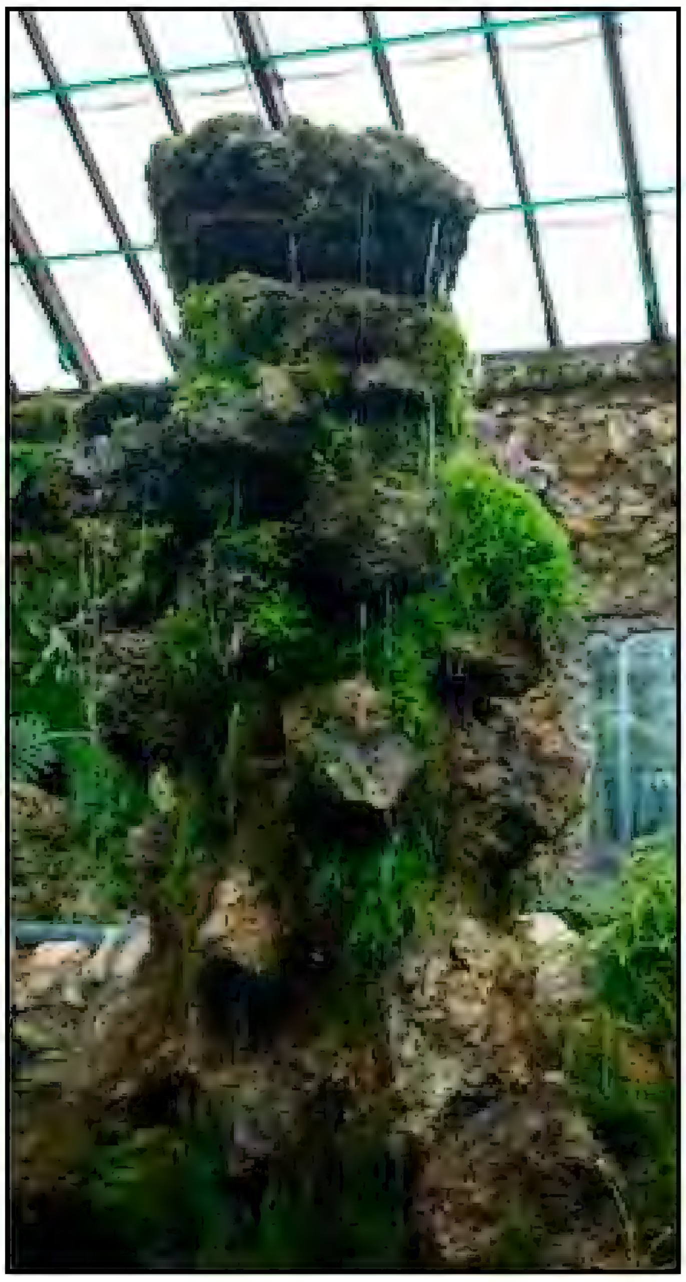

Fig. 4. Central waterfall

The boilers and pumps have been re-fitted, and a permanent data logger installed to monitor temperature and humidity. An area of unsafe rock-work has been restored by Paul Sherman of North West Heritage, using lime mortar rather than the unyielding cement of previous repairs, the latter probably being partly responsible for the problem. Volunteers have carried on with weeding out asparagus, often having to use hammer and chisel, and the baby tears and oxalis, when tweezers are often the best implements to extract roots from the crevices! (Figs 5 and 6)

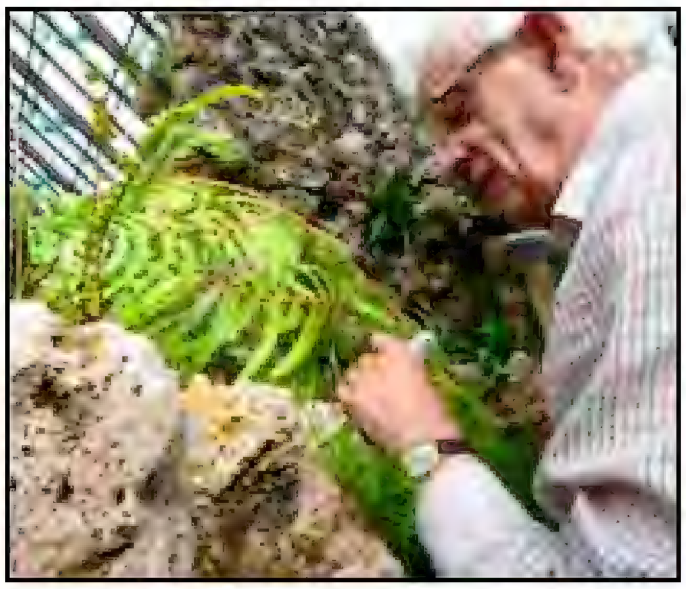

Fig. 5.Weeding out asparagus

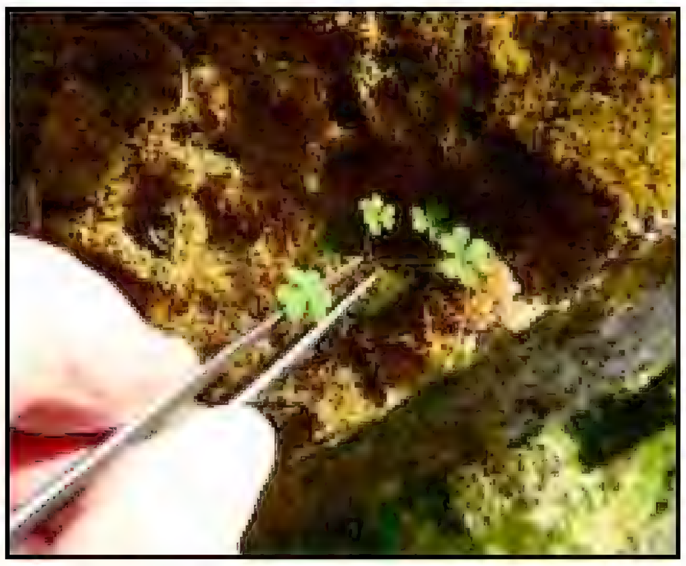

Fig. 6. Tweezers used for the oxalis

As Spring has progressed this year, we have been delighted to see the ferns flourishing, and other plants come into flower. In February we had a spore-sowing workshop in the Fernery, with volunteers learning how to sow the spores from the BPS spore exchange. The Epiphyllum flowers have been spectacular (Fig. 7), and we have also had a good show of Christmas cactus flowers (Fig. 8), thanks to Gunnar Ovstebo, who donated many of his own plants.

An update on Southport Fernery

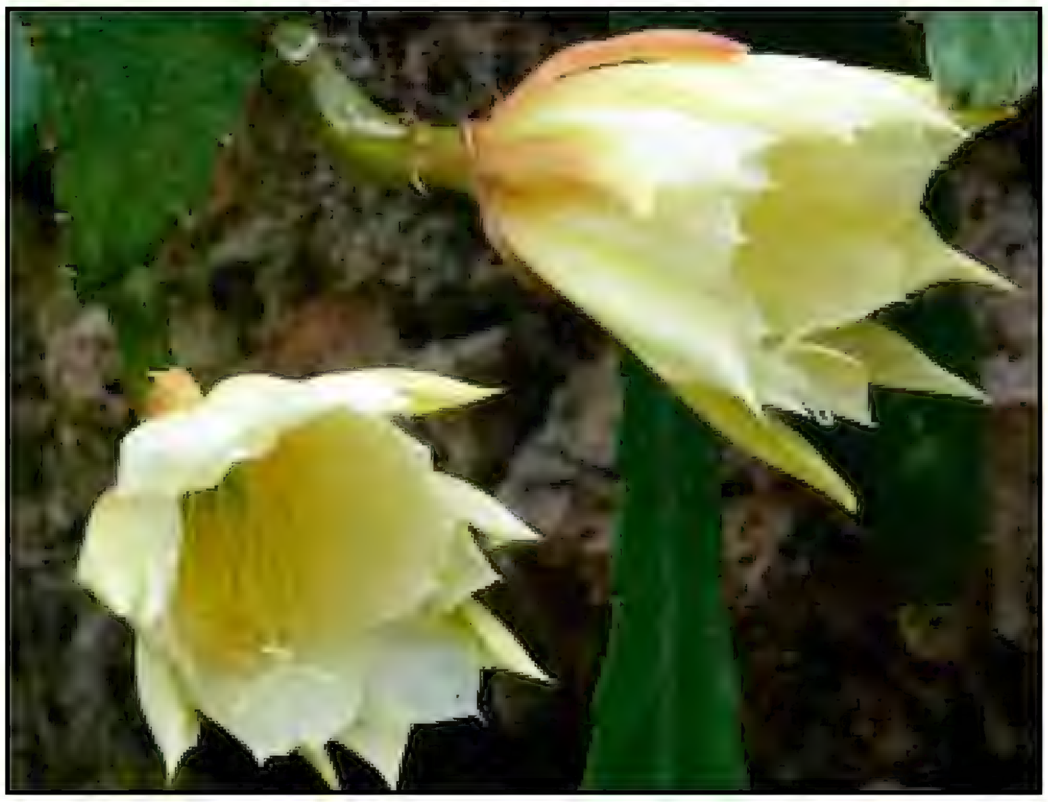

Fig. 7. Epiphyllum looking spectacular

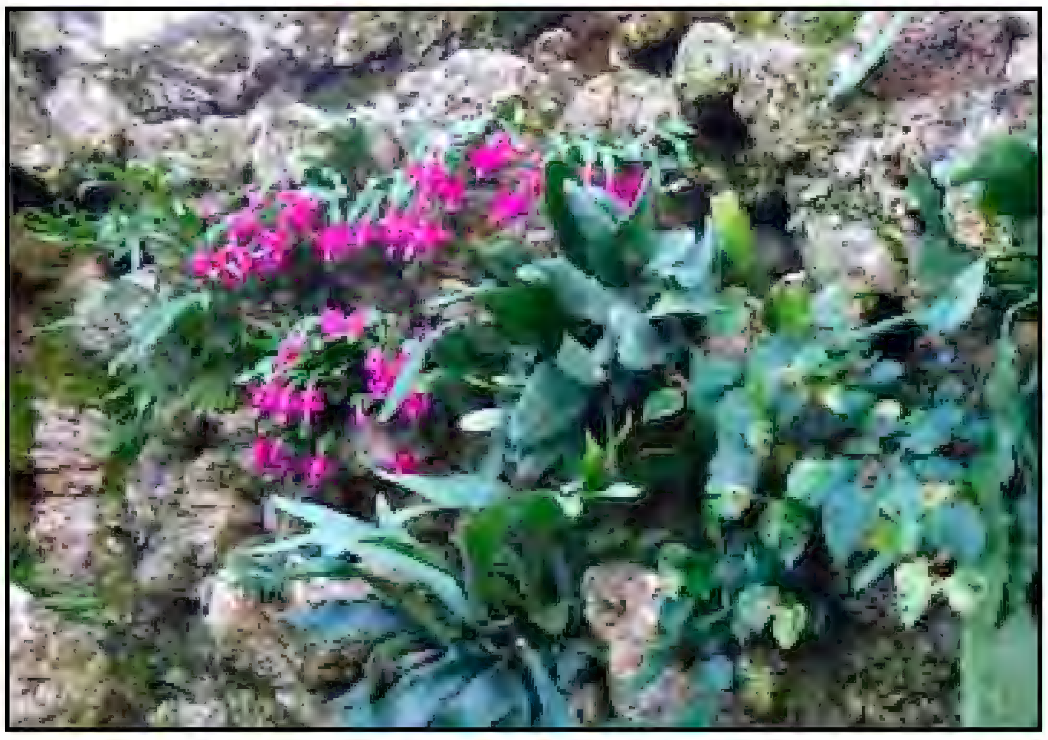

Fig. 8. Christmas cactus

Henry Folkard gave us *Paphiopedillum insigne*, which seems to like its new home (Fig. 9). We have had donations of ferns from several BPS members, particularly Michael Hayward, Peter Blake, Yvonne Golding, and Robert Crawford. A really useful gift came from BPS member Brian Kelly, who gave us an extra-long watering lance (Fig. 10). Now the *Platycerium veitchii* high up on the arch is looking much happier. An unexpected bonus has been our wild bird life – our resident robin has been joined by blue tits, and a nesting pied wagtail that has four chicks fledging in a wall pocket! The Fernery is a lovely peaceful place to work and to enjoy the ferns (Fig. 12). Do visit the Fernery if you can. If you have some spare time, could you help to maintain this wonderful place? You can keep up to date with events there on my blog on the BPS website https://ebps.org.uk/author/acl-evansbtinternet-com/ or keep an eye on the Southport Fernery album on the Facebook Fern World page.

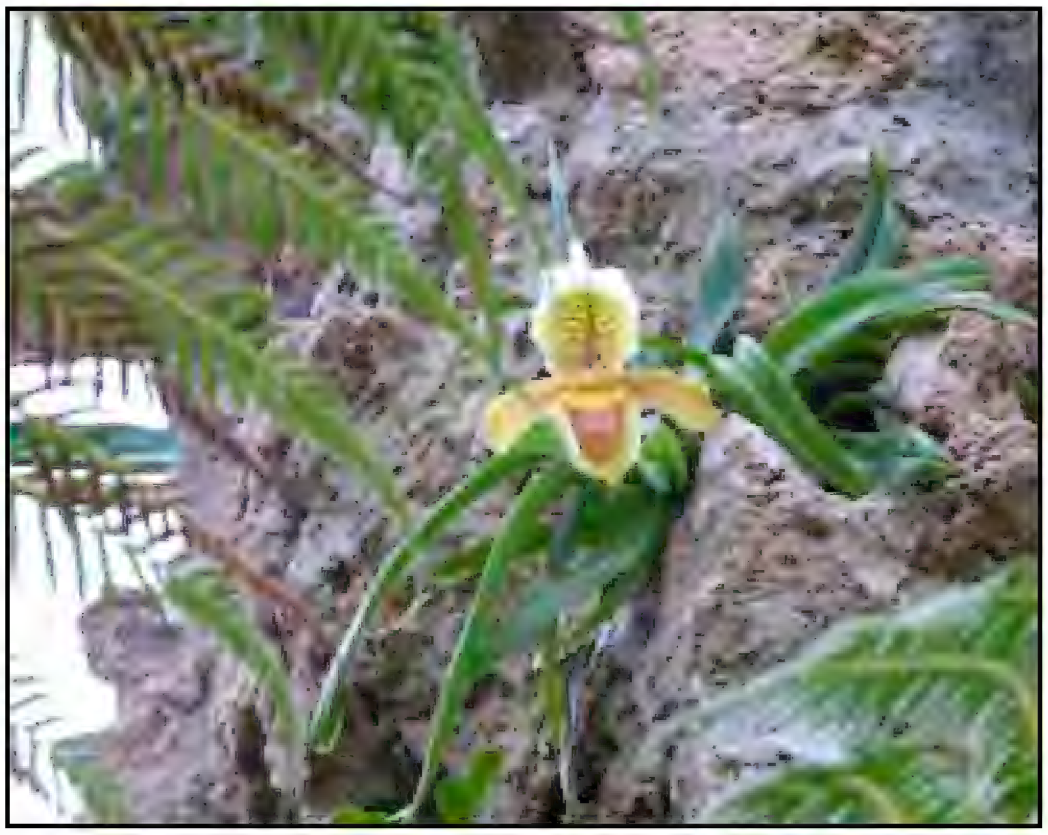

Fig. 9. *Paphiopedillum insigne*

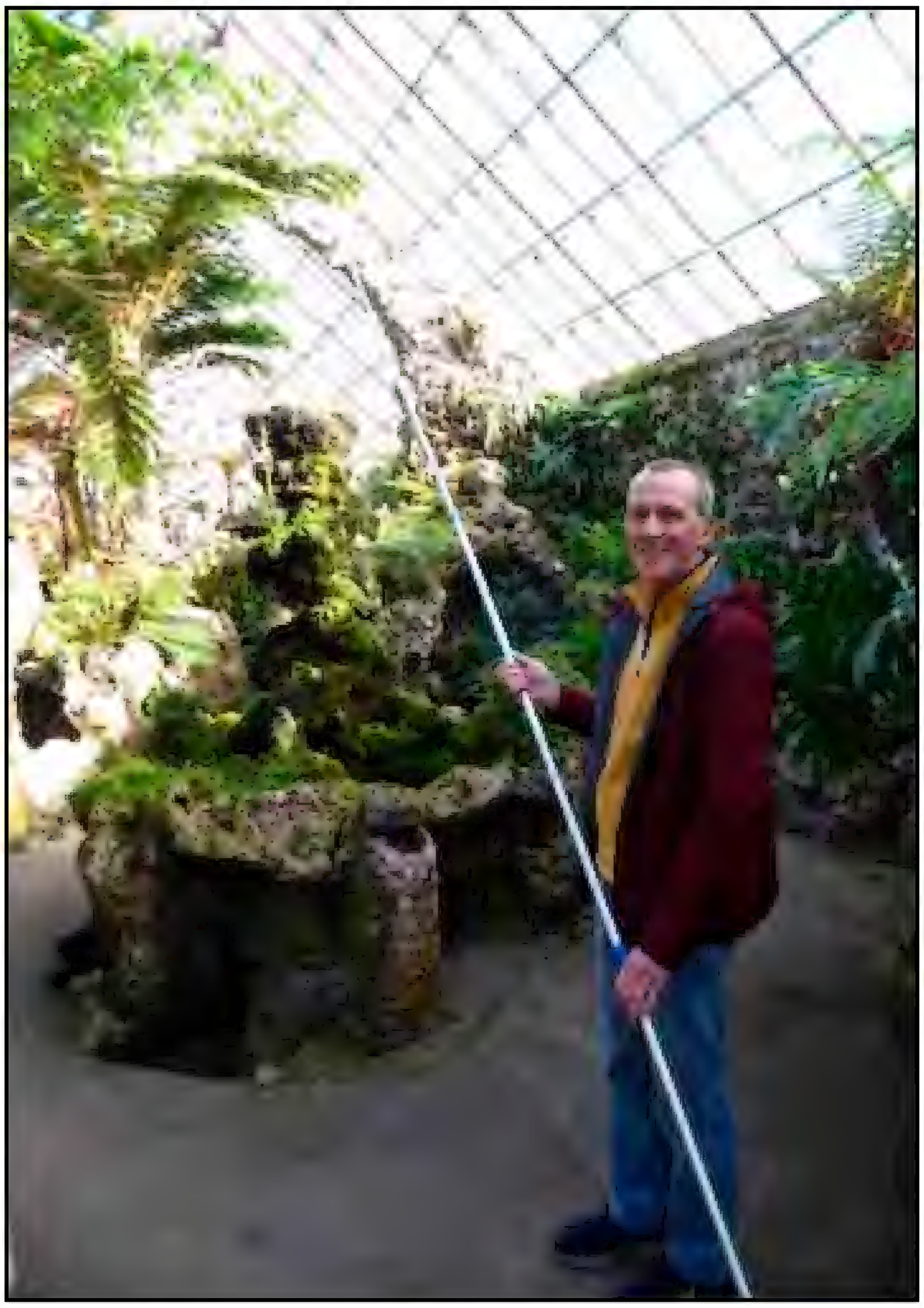

Fig. 10. Brtian Kelly with the extra long watering lance

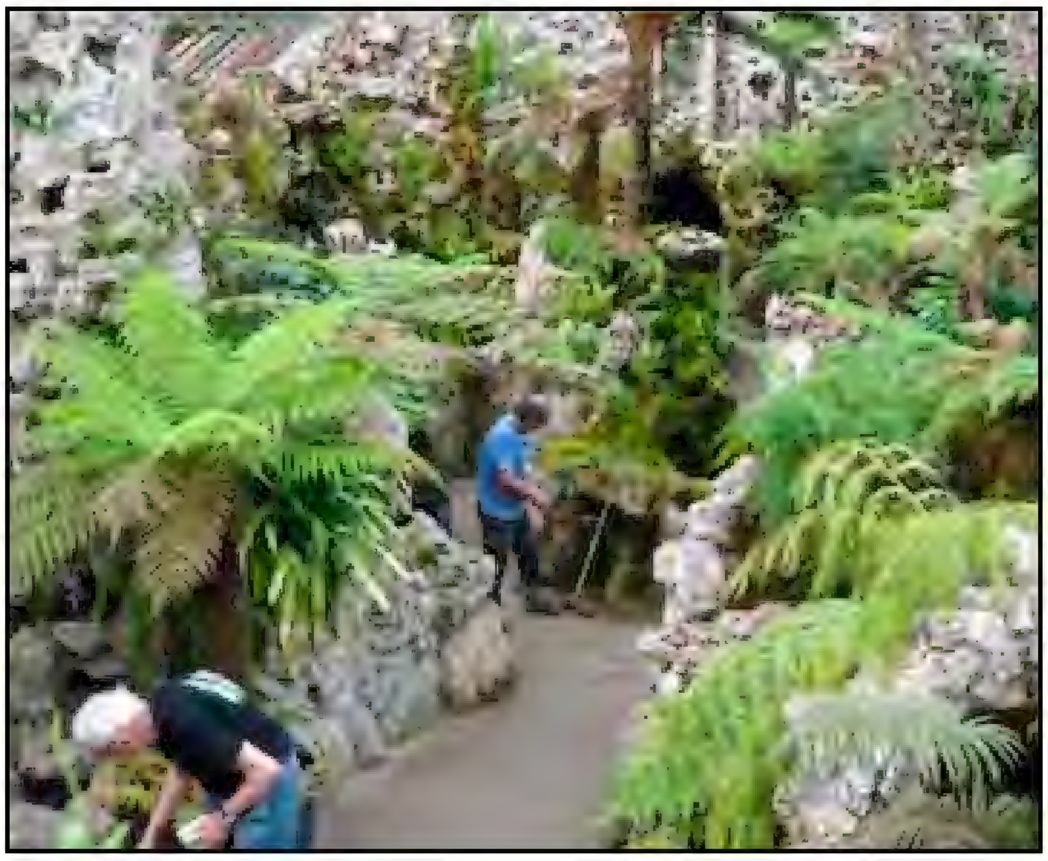

Fig. 11. Michael and Gary working in the Fernery

Dennstaedtia wercklei

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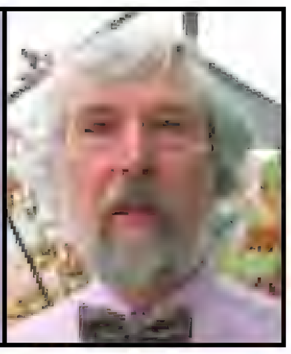

Perhaps I was a little disingenuous when I wrote *What is the ugliest fern?* in *The Pteridologist* 6(5);391-2. Anyway, I had more e-mails sent to me than ever about the article, mostly because I had never had anyone write to me about articles in *The Pteridologist* before!

However, there are a few ugly ferns that are far uglier than the rather plain *Cyrtomium fortunei*. I was on a reconnaissance in Costa Rica with Harald Schneider, Paul Ripley and Klaus Mehltreter prior to the Fern Society joining us at the end of the week. Klaus had done nearly all the planning of places to visit and wanted to take us to a nature reserve with a field station to check it out. There was some disagreement, so we sought another place and found a private nature reserve not far away. Being late in the day we had dinner but did not make our way far down into the crater; we knew this would be a very good place to take the group.

Taking the group back near the end of our Costa Rican tour, it took a while making our way through four large villages in convoy to reach Laguna de Hula. Since it was close to lunch time our host prepared us a very fine meal. As on our reconnaissance we had a choice of meat or fish; basic though very good. We were dining overlooking the dormant volcanic crater with an absolutely stunning view; the jungle extending almost to the house.

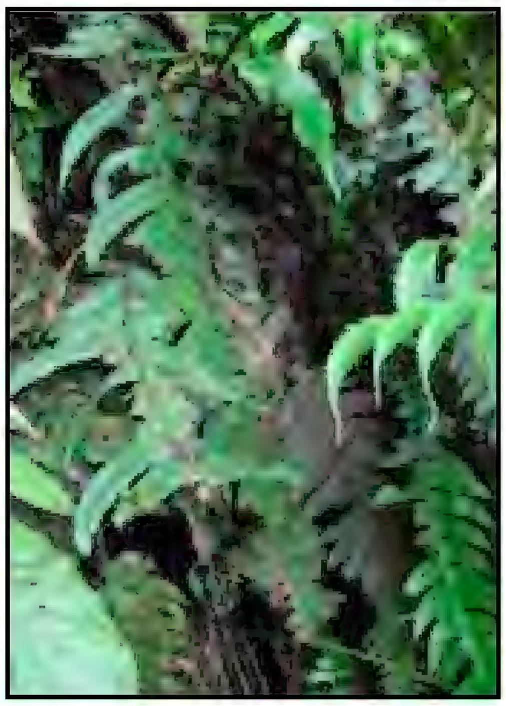

Fig. 1. *Dennstaedtia wercklei* on rock face

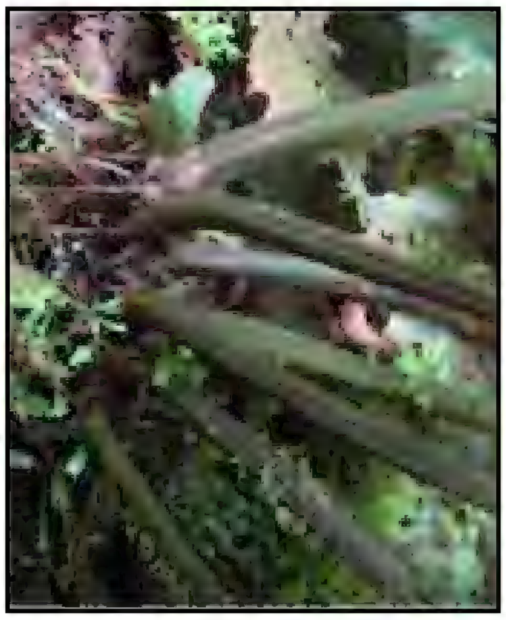

Fig. 2. *Dennstaedtia wercklei* frond bases showing budding at the base of fronds and the swollen rhizomes clinging to the near vertical rock face

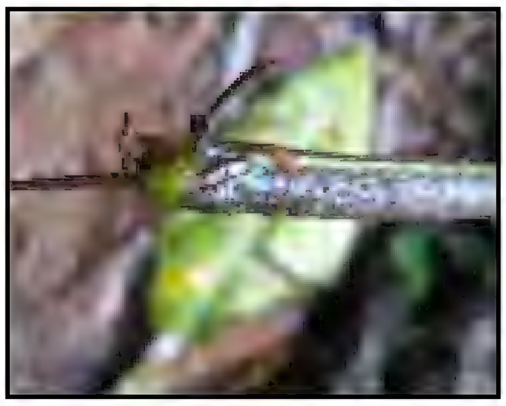

Fig. 3. Frond base of *Dennstaedtia wercklei* showing bud swelling

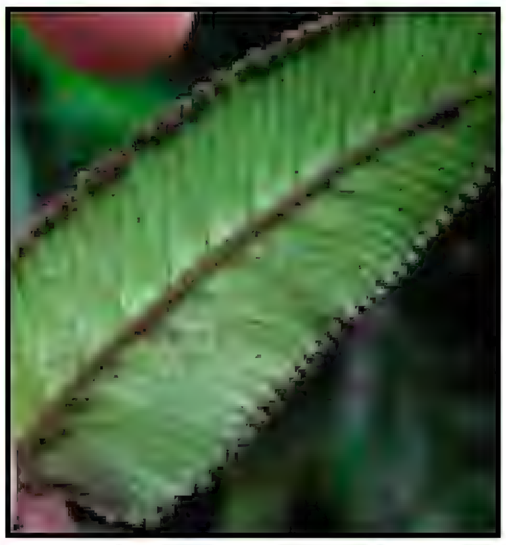

Fig. 4.Cup-shaped indusia of *Dennstaedtia wercklei*

After lunch we set off along the rim of the crater on a well-defined track, which then led down inside the volcanic crater. We had already seen many ferns during the previous few days and our brains were overloaded, but we could record and photograph them.

Fortunately, at this point we were beginning to spot ferns that we knew we had not seen before. Notably among these were ferns we had seen in other countries and others we knew only from floras because of their uniqueness. *Thelypteris heracleifolia, Hemidyctum marginatum* (Fig. 9.) and *Lonchitus hirsuta* were chief amongst the specialities.

And then under a steep rock flowing with water and covered with a verdant tangle of mosses, juvenile sporelings, and a dishevelment of ferns and bryophytes of all shapes and sizes, was this green-brown strap-like ugly thing. Definitely something I had never seen before. (Fig. 1.) I couldn't be certain what it was. I called Klaus over, but even he had problems with it. It was clearly a fern, having cup-shaped indusia along the margins of its hairy unearthly coloured fronds (Fig. 4.) that were hanging in the falling water. Klaus suggested it must be a Dennstaedtia.

Taking a frond to the Natural History Museum a few days later I was able to identify it as *Dennstaedtia werklii*.

I wonder what you think of it?

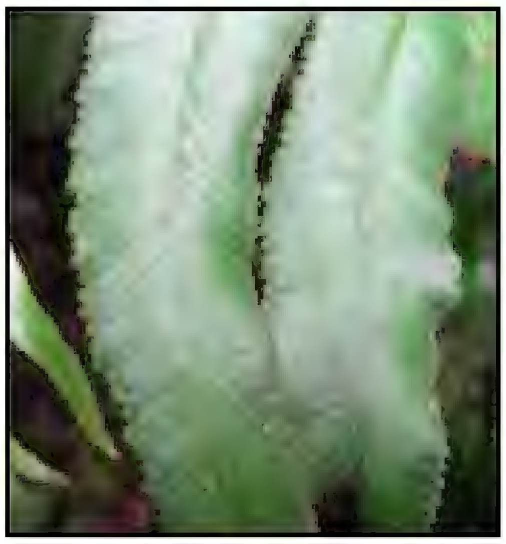

Fig. 5. Close up of upper surface of the pinna showing indusia pointing away

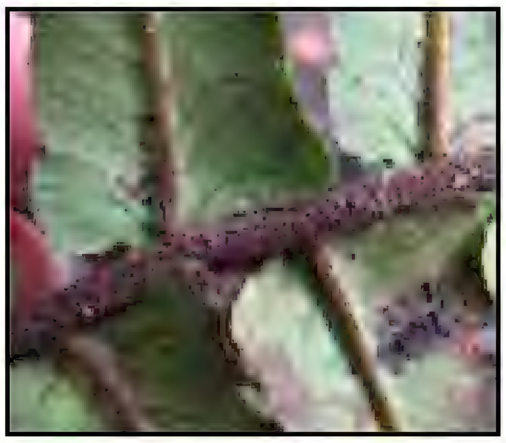

Fig. 6. Lower surface of pinna showing rough surface and colonising moss

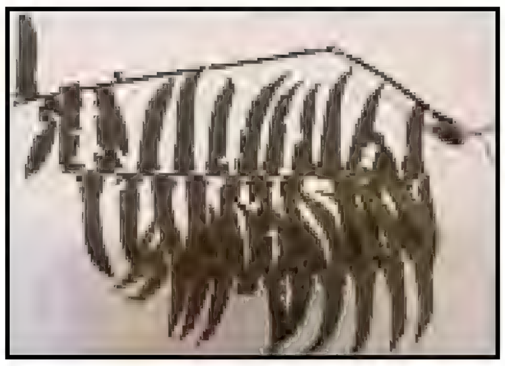

Fig. 7. *Dennstaedtia wercklei* herbarium sheet (with permission of the Natural History Museum, London)

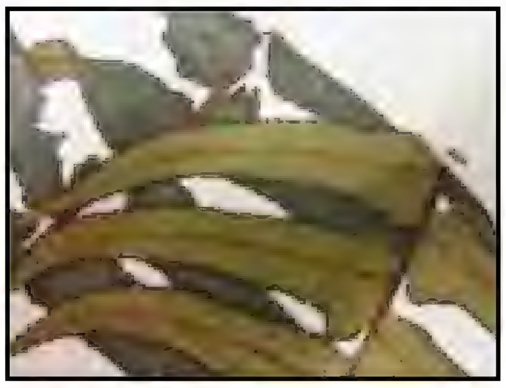

Fig. 8. *Dennstaedtia wercklei* herbarium sheet showing colour of both faces (with permission of the Natural History Museum, London)

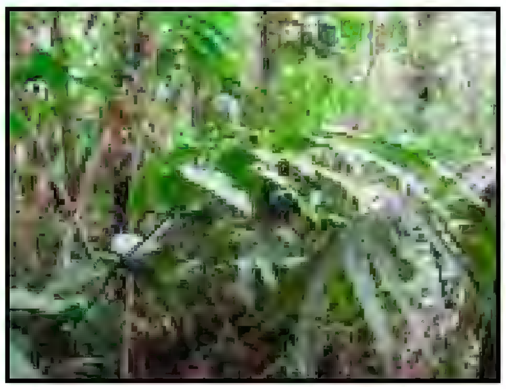

Fig. 9. *Hemidyctium marginatum,* showing size

Polypodium australe ‘*Cambricum Oakleyae*’

Some Light on the Confusion

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This plant has been on my mind for the last 3 years and it is about time for me to get it out of my system.

I have bought this fern from a number of good nurseries and given it by other members of the BPS but each time I ended up with a lovely fern but not the real deal.

History

The original plant was found at Raglan by Mrs Bagnall Oakley in 1868 it is described by MacSelf as differing from other members of the Cambricum cultivars as having “shorter fronds and stipes giving the plant a dwarfer appearance although its fronds are large and spreading”

This is what Charles Druery says about Cambricum forms:-

“C. Barrowii, c. Hadwinii, c. Oakleyae, c. Prestonii.These are all quite distinct forms of Cambricum, and very beautiful; Barrowi is a robust grower with longer and more acutely pointed divisions than Cambricum, and Prestonii is much denser; Hadwinii is a narrow form with blunter divisions, ***and Oakleyae a smaller grower than the others ; all are perfectly barren.****”*

They may be distinct, but only if you knew what they were in the first place. We are so fortunate that Martin Rickard has taken on the task of sorting them all out, producing a simple guide to differentiate between them.

Charles Druery says they are all perfectly barren but the plant sold by so many as ‘Oakelyae’ is in fact a nice fully fertile ‘Pulcherrimum’ and not a Cambricum type at all, but which ‘Pulcherrimum’ has been lost in time.

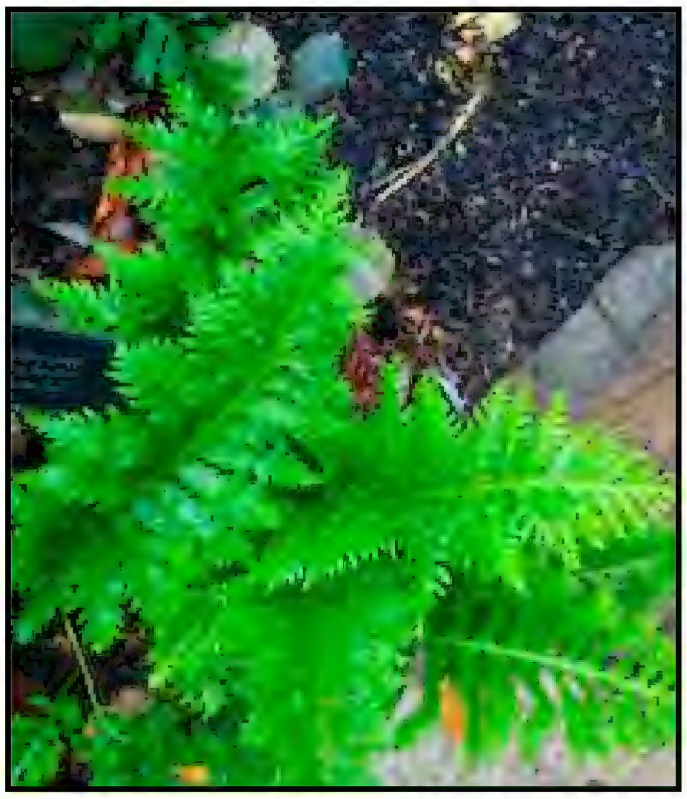

Fig. 1. A division of Mr. Brown’s ‘Oakelyae’, which turned out to be a ‘Pulcherrimum’

Last year Alec Greening took me to see a Mr Brown who had bought ‘Oakelyae’ from Reginald Kaye (Fig.1) I was looking forward to seeing the real thing, but it was again a ‘Pulcherrimum’. This tells me that Reggie was selling it as ‘Oakelyae’ and I can only assume he got it named as this and, like so many, just assumed it was right. Everyone since has followed the assumed wisdom. We now know that the plant being sold was not the real thing, so where is it?

Fig. 2 shows the MacSelf picture from his book ‘British Ferns’ (Young Collectors Series)

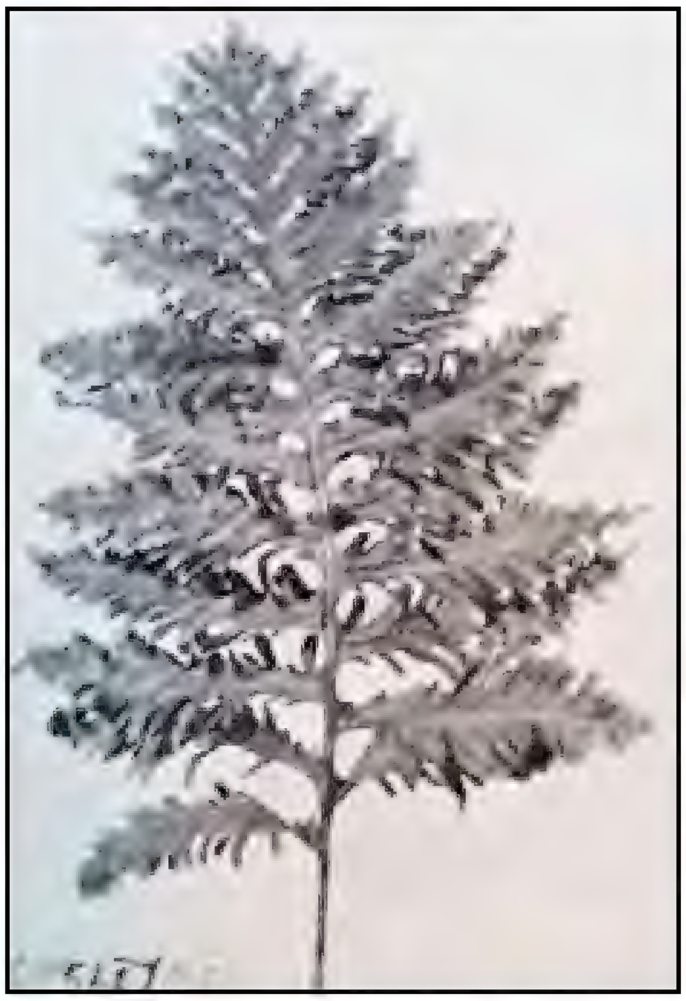

Fig. 2. The image of ‘Oakelyae’ from ‘British Ferns’ by A.J. Macself

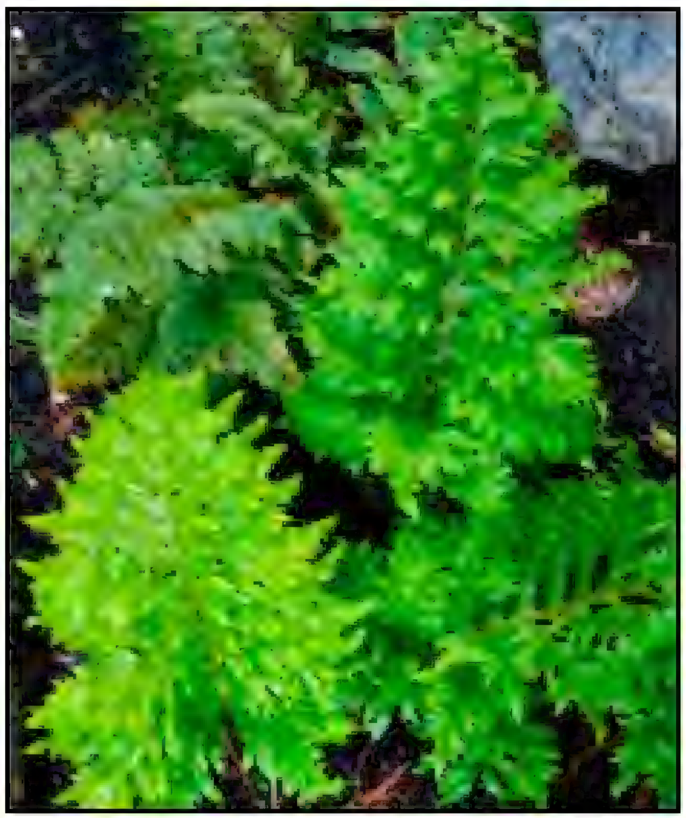

Fig. 3. A likely candidate found in a South Cumbria garden

I found a possible candidate in a South Cumbrian garden at Grange-over-Sands during a ‘Cultivar Hunt’ (Fig.3) and unless the plant dramatically changes I believe this is ‘Oakleyae’. It is dwarfer than the others

When I asked Martin Rickard about the history of *Polypodium australe* ‘Cambricum Mrs Marston’ he told me he saw it at Mrs Marston’s nursery in Yorkshire. It was different to anything else so he named it ‘Mrs Marston’. I am running a comparison but I suspect that ‘Mrs Marston’ could be ‘Oakeleyae’ as well (Fig.4)

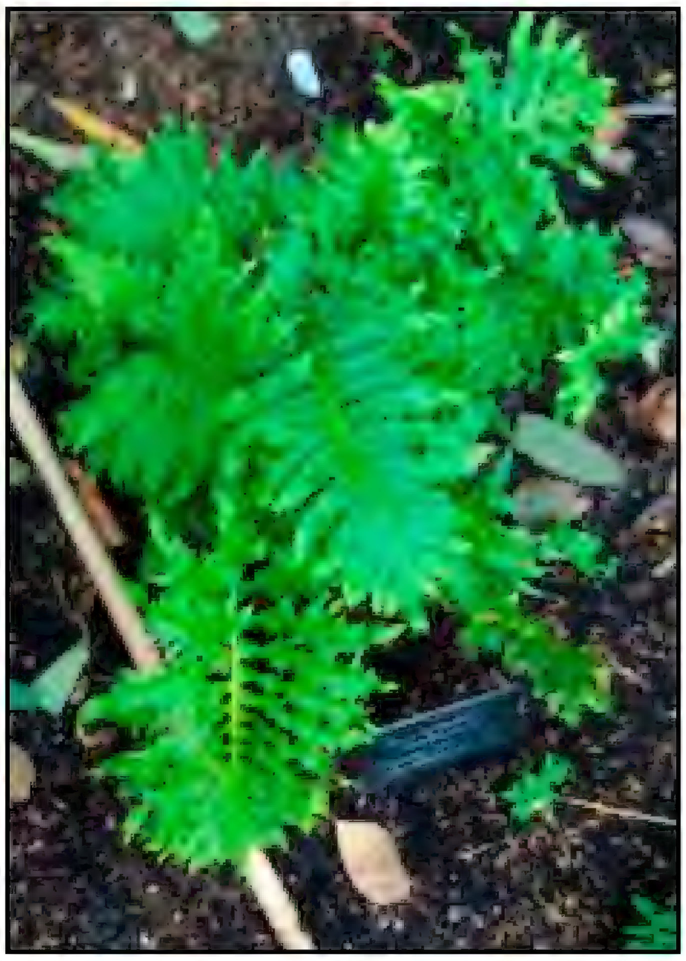

Fig. 4. *Polypodium australe* ‘Cambricum Mrs Marston’, but is it ‘Oakelyae’

Martin Rickard is very wary of using size in Polypodiums as a means of identification and with good reason. However the make-up of it has me believing the South Cumbria clone is ‘Oakelyae’ and I still suspect ‘Mrs Marston’ is as well.

References:

Druery, C.T. (1910). *British ferns and Their Varieties*. George Routledge and Sons

Lowe, E.J.(1908). *British Ferns* (Young Collectors series) Swan Sonnenschein

Macself, A.J. (1952) *Ferns for Garden and Greenhouse*. Collingridge

Woodwardia in Cultivation

Tim Pyner (In Memoriam)

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Commonly known as chain ferns, *Woodwardia* are some of the most spectacular and imposing ground ferns that can be grown in temperate gardens. The frond length of European chain fern, *W. radicans*, can exceed 3m in its natural habitats. Ideal growing conditions are not easily replicated in cultivation but fronds of 2m or more for this species can be achieved.

The most commonly cultivated species have erect or shortly creeping rhizomes and leathery, winter-green fronds. Two species have far-creeping rhizomes and are deciduous, the fronds dying as winter approaches. The young fronds of most species are colourful, mostly in shades ranging from bronze through to bright red. The young fronds of *W. unigemmata* and *W. prolifera* are amongst the most intensely coloured of all cultivated ferns (Fig. 1).

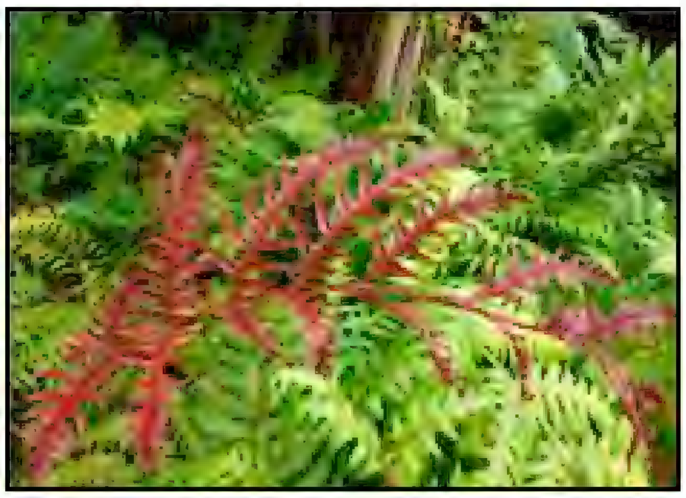

Fig. 1. Young fronds of *Woodwardia unigemmata* showing it's intense colouring

The fertile, spore-bearing fronds resemble the sterile fronds in all species apart from *W. areolata*. *Woodwardia radicans* and other closely related species usually produce bulbils or plantlets on the fronds that afford a means of vegetative propagation.

The name chain fern refers to the arrangement of the sori. These are located close to the midrib of the frond lobes and are formed of elongated segments resembling a chain of sausages (Fig. 2).

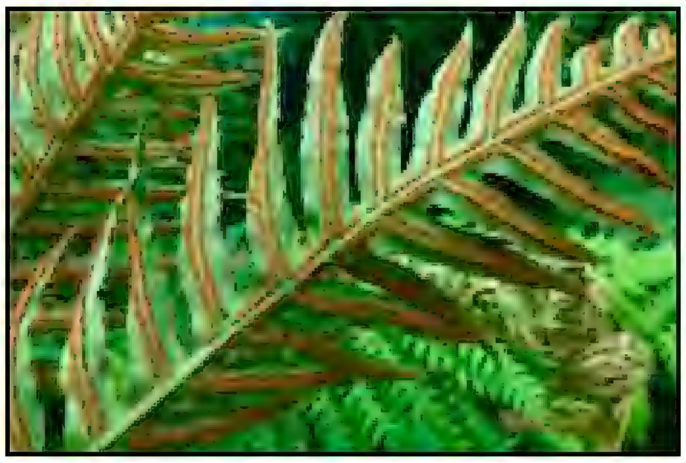

Fig. 2. The sori arrangement of *W. semicordata* showing the chain arrangement

This article was prompted by the realization that two of the most frequently cultivated species, *W. radicans* and *W. unigemmata*, have few differentiating characters. Without knowing the geographical origin of a plant it is sometimes difficult to decide which species is being grown. I have therefore checked many herbarium specimens at the Natural History Museum in London, read various papers and articles, and visited gardens and fern growers to find reliable characters to identify plants grown in British and Irish gardens.

Taxonomy

Recent molecular studies confirm previous hypotheses based on morphology and cytology that *Woodwardia* belongs to the family Blechnaceae. Cranfill & Kato (2003) demonstrate that the woodwardioid ferns form a monophyletic clade that forms the sister group to the remainder of the Blechnaceae. They recognize 14 species but separate *W. areolata* and *W. virginica* into two segregated genera, *Lorinseria* and *Anchistea*, respectively.

I am persuaded by their arguments for separating these two genera. They cite unique and aberrant morphological characters, unique cytology, a long history of separate evolutionary existence, and geographical isolation – both occurring in eastern North America. However, for practical reasons I include them here as species of *Woodwardia*.

Apart from the enigmatic Mexican species, *W. martinezii*, the remaining species are placed in three sections. Most hardy species are in section *Woodwardia*, and can for convenience be separated into the Old World and New World groups. Old World species are found from the Himalayas eastwards to Japan and Taiwan and south to islands in Indonesia and the Philippines. One species, *W. radicans*, has a disjunct distribution and is found in Macaronesia and more rarely in southern Europe. The New World species range from Canada south to Costa Rica. Species in subtropical areas tend to grow in mountainous regions.

Section *Japonicae* with two or three species is rarely cultivated. Neither bulbils or plantlets occur in this section.

The third section, *Chieniopteris*, is maintained as a separate genus by Chinese botanists. The two small species are attractive but I am not aware of them being in cultivation.

Species in cultivation

There appear to be eight or possibly nine species in cultivation in western Europe. I discuss the European and Asian species first, then the American species. Within these geographical groupings they are listed in order of frequency of cultivation.

European and Asian species

These species can be recognized by the fact that most produce plantlets or bulbils on the fronds (Fig. 3).

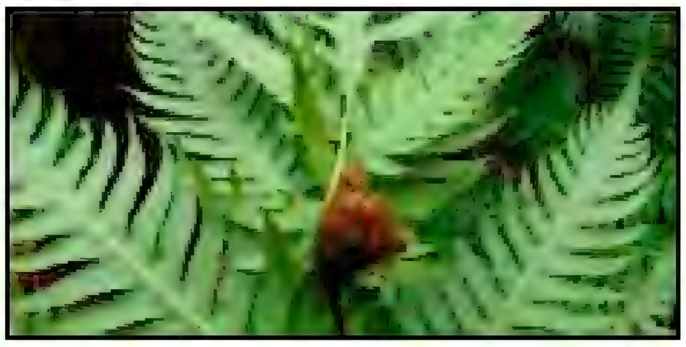

Fig. 3. Bulbil on *W. radicans*

Woodwardia radicans

The natural range of this species is Macaronesia and southern Europe. It is found abundantly in the Azores, Madeira and high rainfall areas of the Canary Islands. It also occurs rarely in Portugal, Spain, Italy and also on the islands of Corsica, Sicily and Crete. It has also been recorded from Algeria, apparently as an introduction. It demonstrates a relictual distribution, which means it was once more widespread, and shares close ancestry with *W. unigemmata*. The split between the two species is estimated to have occurred about 13 million years ago (Li *et al.* 2014).

Woodwardia radicans is very common in parts of the Canarian and Madeiran archipelagos. It can form huge stands on steep, forested mountain slopes. The large fronds arch over and downwards, often resulting in the apical bulbil rooting when it touches the ground (Fig. 4).

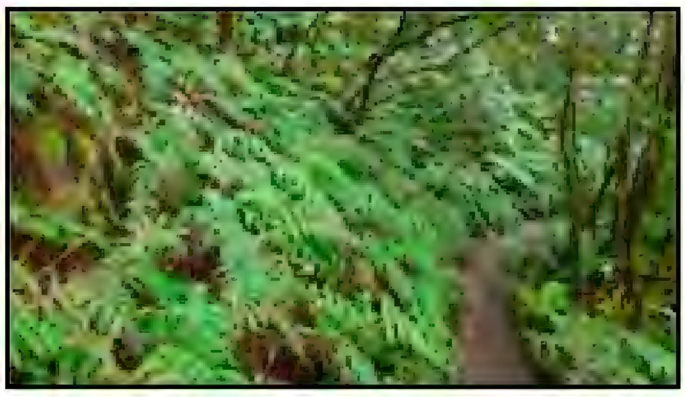

Fig. 4. *W. radicans* in its typical habitat in Tenerife

Most clones withstand frosts to -5°C (RHS hardiness rating H3). Occasionally I have come across healthy plants that have survived temperatures briefly down to -10°C (H4). As it is generally less hardy than *W. unigemmata* the latter is now more commonly planted.

The thick rhizome is erect or ascending and carries large, arched, evergreen, bipinnatifid fronds of one type, to 2m long, rarely to 3m. These usually bear one to three large, scaly bulbils in the axils of pinnae near the frond apex. The stipe (frond stalk) is up to half as long as the leaf blade.

This species is the most frequently encountered in gardens, although it is being usurped by *W. fimbriata*, and has been grown since the late 18th century. Several large gardens in Cornwall, Ireland and Scotland host spectacular colonies.

A few cultivars with atypical fronds, such as 'Burgessiana', 'Cristata' (syn. 'Brownii') and 'Plumosum McCormack', have been described but have not been seen recently. The cultivar 'Crispa' actually belongs to *W. prolifera*.

Woodwardia unigemmata

This is similar to the previous species in overall appearance but the fronds are relatively narrow with more widely spaced pinnae. A large colony of this magnificent fern can create an awesome spectacle in spring and summer when a mass of intensely coloured young fronds are unfurling. In the best forms they are a bright red but can vary from orange through to burgundy. As the fronds mature they fade to green but new fronds usually emerge throughout the growing season giving a long period of colour (Fig. 5).

Woodwardia unigemmata occurs naturally over a vast area of east Asia, from India through China to Japan and Taiwan. Fraser-Jenkins (2008) has shown that *W. biserrata*, a name that could have usurped *W. unigemmata*, is actually based on a wrongly localised specimen of *W. fimbriata* and can be disregarded.

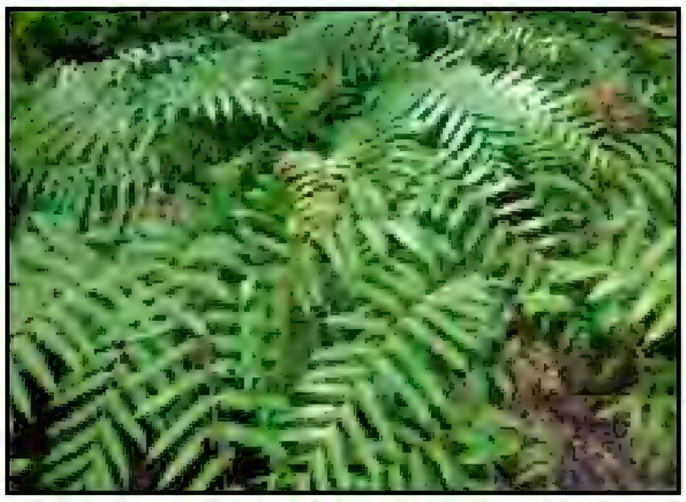

Fig. 5. *W. unigemmata* in cultivation

It has been introduced to cultivation many times from different localities, resulting in variation in frond form and colour intensity. Additionally, several different clones with undulate fronds are in cultivation.

There is also some variation in cold hardiness. However, most clones seem to be significantly hardier than *W. radicans* and are undamaged at -10°C (H4), and some can survive lower temperatures.

Woodwardia unigemmata has become popular and widespread in cultivation within the last 40 years. It is now much more frequently planted than *W. radicans*. The superior hardiness and colourful new growth combine to make this fern an ideal subject for gardeners who require a feature plant that is both spectacular and easy to maintain.

Differentiating *W. radicans* and *W. unigemmata*

The differences between *W. radicans* and *W. unigemmata* are subtle. Although the extremes can be told apart fairly easily, some plants are almost impossible to identify conclusively. I first became aware of this problem after being asked to identify Woodwardias in a Cornish garden during October 2013. Despite my initial confidence I found that I was unable to name several with any certainty.

Importantly, it should be noted that bulbil number is completely unreliable for identification purposes. Both species can produce one to three plantlets in the upper pinnae axils, and occasionally even more; up to seven have been reported in *W. unigemmata*.

The intensity of red pigmentation in the colourful new fronds is very useful. *Woodwardia unigemmata* usually has bright reddish or orange new growth, whereas colour is usually lacking or faint in *W. radicans*. However, many plants of *W. radicans* have some trace of colour, and occasionally a pale orange colouration.

Of course, unfurling frond colour is no help during winter or when young fronds are lacking. The fronds of *W. radicans* often appear more foliose or leafy, with broader pinnae and lobes that are more densely arranged on the frond. However, this can vary and both species can look very similar. Good illustrations of frond silhouettes can be found in Hoshizaki & Moran (2001).

The most reliable differentiating character is found in the vascular structure of the pinnae. In *W. radicans* the basal pinna lobes are usually catadromous, i.e. the first lobe arises basiscopically (on the side of the pinna that faces the base of the frond) (Fig. 6). In *W. unigemmata* the vein branching is anadromous i.e. the first lobe arises acroscopically (on the side of the pinna that faces the apex of the frond) (Fig.7). The latter species therefore has pinnae that appear to lack a basally projecting lobe adjacent to the rachis. Although a rather technical distinction, it does prove reliable in the majority of cases. It is important to check for presence of a vein in the lobe, as occasionally an unveined lobe can be present in *W. unigemmata* that can be misleading. Several fronds on a plant should be checked, as aberrant fronds can be present.

Despite this, knowledge of the geographical origin of a particular plant is the most helpful and reliable aid to identification.

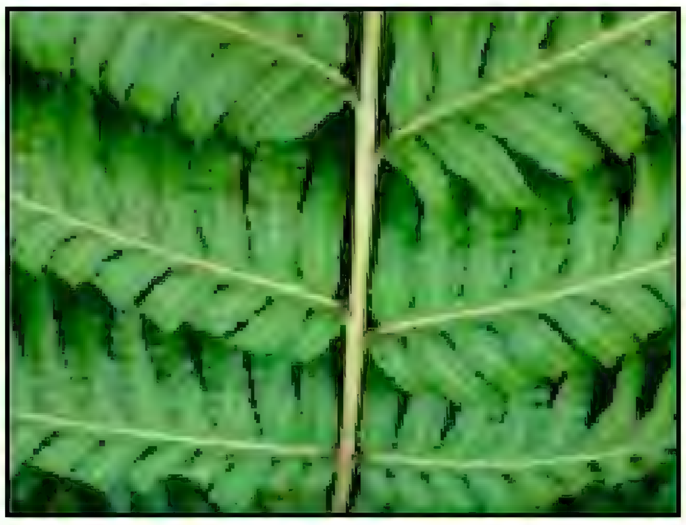

Fig. 6. The basal pinna lobes of *W. radicans* showing it's caladromus habit

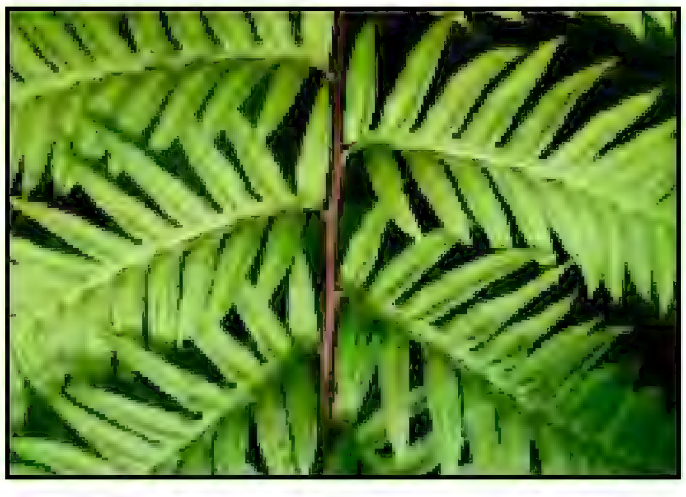

Fig. 7. The basal pinna lobes of *W.unigemmata* showing its anadromus habit

Woodwardia orientalis & *W. prolifera*

These two species are similar in overall appearance to *W. radicans*. Until recently, *W. prolifera* was considered to be a variety of *W. orientalis*. In western horticulture a lack of understanding of the characters used for separating the species has lead to confusion regarding the correct name.

Both species produce tiny plantlets on the upper surface of the frond that are very different from the larger, scaly bulbils produced in the pinnae axils of *W. radicans* and *W. unigemmata*.

Woodwardia in Cultivation

Plantlets occur in both species, sometimes completely covering the frond surface.

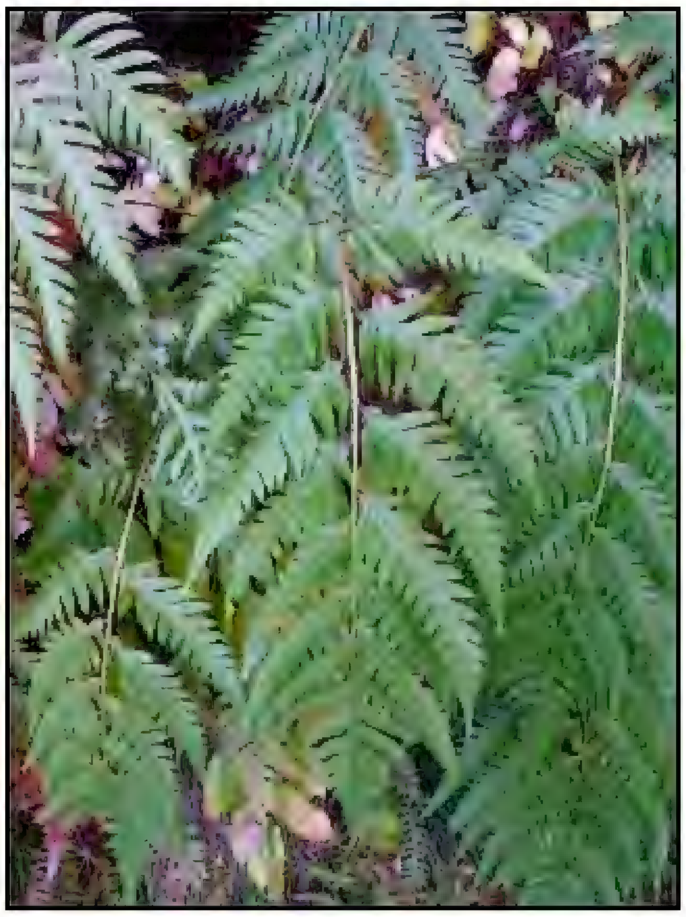

Fig. 8. *W. orientalis* in its natural habitat

It is now known that *W. orientalis* is a fertile allotetraploid species derived from a sterile hybrid between diploid *W. prolifera* and a second, as yet uncertain, species (Takamiya *et al.* 1992). Most plants in cultivation appear to be *W. prolifera*. True *W. orientalis* is possibly grown and I am currently searching fern collections for plants that may be it.

Woodwardia prolifera is a large plant that can have fronds more than 2m in length. The young fronds vary in colour, sometimes green but often very intensely coloured carmine or orange, frequently more colourful than those of *W. unigemmata* (Fig. 8). When the fronds are covered in tiny plantlets, *W. prolifera* is easily distinguishable from *W. unigemmata* (Fig. 9). Even when they have dropped, small scars remain on the frond surface.

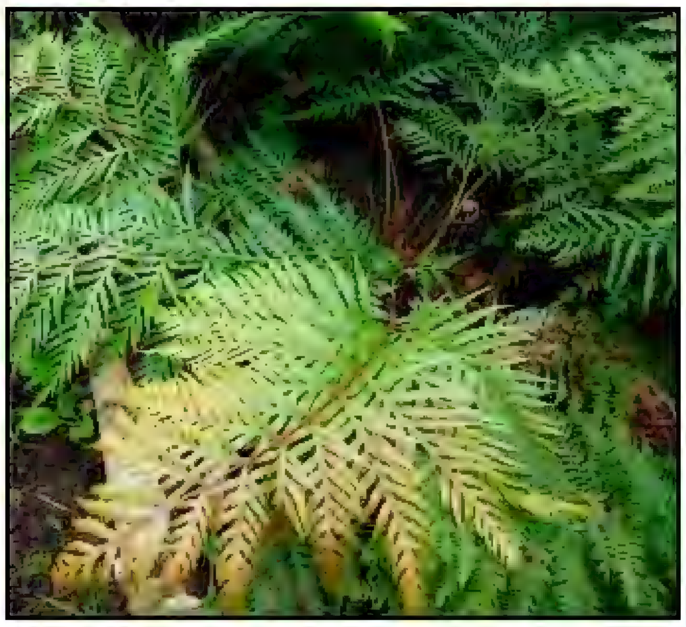

Fig. 8. *W. prolifera* in cultivation

When well-grown the pinnae and pinna lobes of *W. prolifera* are characteristically narrow and attenuated.

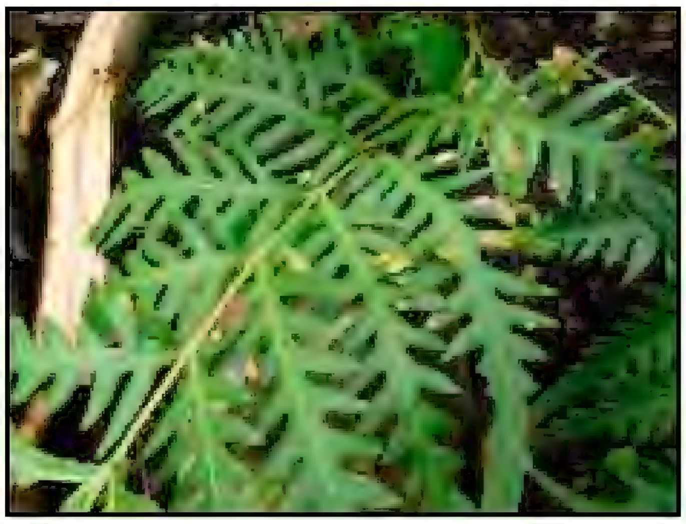

Fig. 9. *W. prolifera* with its lamina bulbils

Another important difference is that two or three basiscopic pinna lobes adjacent to the rachis are not developed. (Fig. 9) However, both these characters may be less prominent in small or young plants.

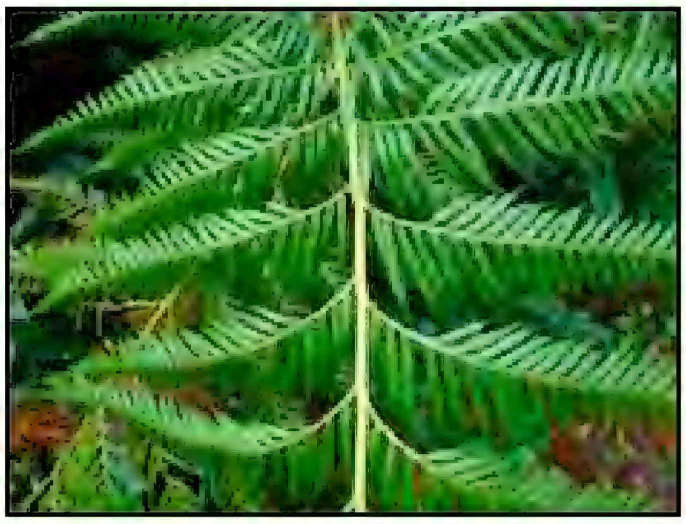

Fig. 9. *W. prolifera* with its missing pinna lobes

Woodwardia prolifera does not appear to be as hardy as *W. unigemmata*. However, it has a similar wide geographic range and I have noted some variation in cold tolerance, but is best treated as an H3 plant.

A cultivar, *W. prolifera* 'Crispa', is rarely encountered. It is a rather scruffy plant with malformed, depauperate fronds that may appeal to lovers of curiosities. Spore and stomata measurements indicate that it belongs to *W. prolifera*. It appears to be relatively hardy and has survived temperatures of -10°C in my Essex garden.

As is frequently the case with polyploid ferns, true *W. orientalis* is a smaller plant than its diploid parent. The fronds typically reach 1m in length. The pinna lobes are relatively broad and are acute to acuminate and rarely attenuated. Only the first basiscopic pinna lobes are missing (Fig. 10).

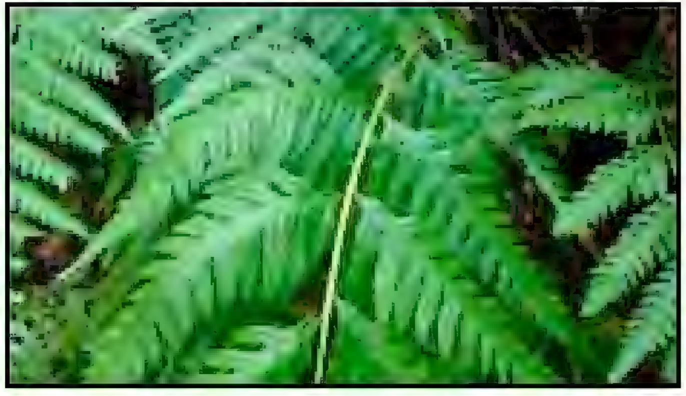

Fig.10. *W. orientalis* with its first basiscopic pinna lobes missing

In 2014 I encountered *W. orientalis* growing wild in Japan and noted its strong resemblance to young plants of *W. prolifera*. There are significant differences in spore size that should help detect this plant in cultivation. There are also small differences in average stomata guard cell length that may prove helpful when identifying young plants. In Japan, *W. prolifera* tends to occur in coastal locations whereas *W. orientalis* grows inland at moderate altitudes, so it may prove to be more hardy. It is a handsome species that would be useful for smaller gardens.

Woodwardia japonica

This large species has distinctive pinnae that narrow towards their bases and are symmetrically lobed each side of the pinna midrib. The unfurling fronds are brightly coloured. Neither bulbils or plantlets are produced (Figs. 11 and 12).

Although grown in the 19th century it apparently disappeared from cultivation. Rush (1984) records that he was cultivating plants but one in his garden had not survived. I was therefore surprised to see a healthy plant when visiting the magnificent garden of Koen van den Berg in Belgium. He had obtained it from a Chinese nursery as an unidentified *Woodwardia* species. Van den Berg has raised young plants from spores and kindly gave a plant to me, so hopefully it will become re-established in British gardens.

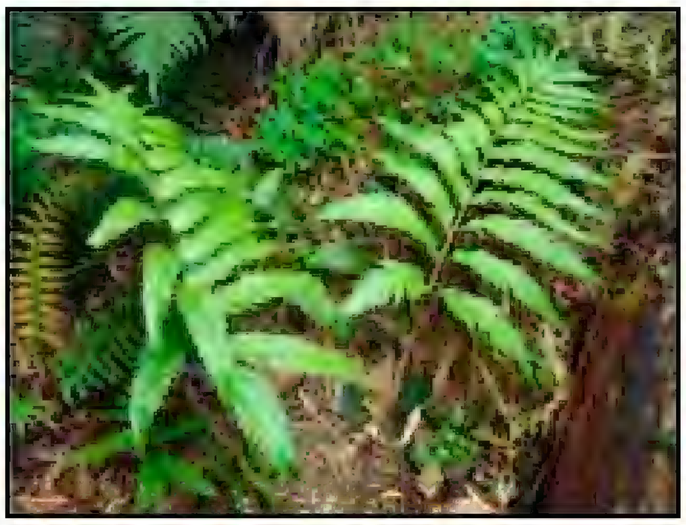

Fig.11. *W. japonica* in the garden of Koen van den Berg

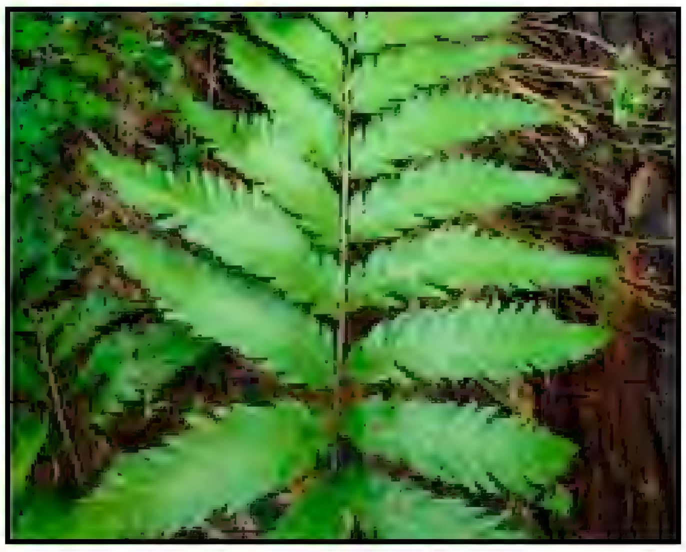

Fig.12. Frond detail of *W. japonica*

An additional species, *W. magnifica*, is recognized in China (Wang *et al.* 2013) although western botanists do not consider it to be distinct. However, a recent study (Li *et al.* 2014) hints that species status may be more appropriate. There is a possibility that van den Berg's plant belongs to this segregate species as the pinna lobes are particularly elongated and pointed. However, further research will be required to establish its true identity.

American species

None of the New World species produce plantlets or bulbils, and only one is commonly grown. Hoshizaki & Moran (2001) give excellent illustrations of all the cultivated American species.

Woodwardia fimbriata

This species is now the most widely available chain fern in UK nurseries and garden centres. It is remarkable that Rush (1984) had no reports of it being in cultivation. Rickard (2000) had it in cultivation but it was then rarely seen and apparently difficult to propagate (Figs. 13 and 14).

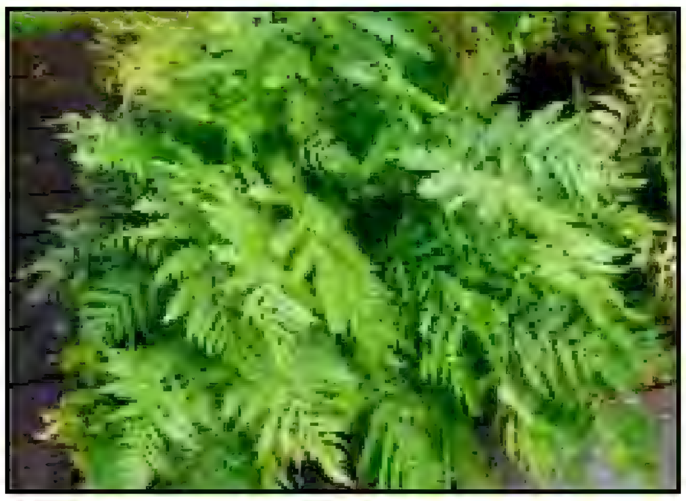

Fig. 13. *Woodwardia fimbriata*, in cultivation, Rens Huiber's garden, Netherlands

Since then it has entered the market of mass-produced ferns and can be found on the fern benches of most garden centres. Even so, it is not a fern that is easily grown. It seems difficult to get established and is then slow-growing. However, I have seen well-grown plants in gardens in counties as climatically different as Dorset and Suffolk, so it obviously tolerates a wide range of conditions once settled in.

It seems to require high humidity, warm summers and mild winters to thrive and is unlikely to survive temperatures below -10°c. Its natural distribution ranges from British Columbia south to Baja California, mostly in coastal areas.

In cultivation I have rarely seen fronds exceeding 100cm, although they reach 2m long in habitat and there are reports of fronds reaching 3m (Taylor 1973). They tend to be held in an upright position, are relatively narrow and the lower pinnae are usually shorter than those above, giving the frond an elliptic or oblanceolate outline. The lower surface of the frond is covered with minute, sessile, yellowish glands that can be easily seen using a hand lens, even on dried fronds. This is an important character used to separate *W. fimbriata* from the next species. The new growth is green.

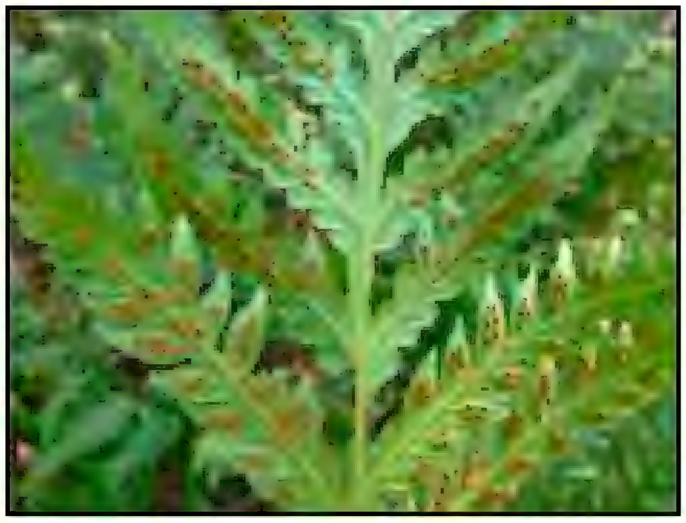

Fig. 14. *Woodwardia fimbriata,* under surface of frond showing sori

Woodwardia spinulosa

This species is closely related to *W. fimbriata*. It is native to mountainous areas of Central America, from north Mexico south to Costa Rica. It differs from *W. fimbriata* in frond shape, being widest near the base, the spreading frond posture, absence of yellowish glands, and presence of small, dissected scales on the frond lower surface.

It is apparently cultivated in North America but is rarely mentioned in British literature. However, Rickard (2000) mentions growing a plant that survived many years in central England. I have yet to see this species in cultivation.

Woodwardia semicordata & *W. martinezii*

Woodwardia martinezii is a small species endemic to a limited area of Mexico. It has a creeping rhizome, short, triangular fronds on relatively long stipes, and long sori that occur alongside all the major veins of the frond. It is taxonomically rather isolated, with its closest relations in Asia. A very attractive fern, it would be a valuable addition to gardens.

Although *W. martinezii* is alleged to be in cultivation, this is incorrect and it has probably never been introduced. The fern grown as that species is *W. semicordata*, which occurs in mountainous areas of Mexico. It was first described as a hybrid between *W. martinezii* and *W. spinulosa* (Mickel & Beitel 1988). Later, Mickel & Smith (2004) treated it as a species, as some forms produce fertile spores, perhaps through apogamy.

Hoshizaki & Moran (2001) also noted that the plant in cultivation in North America is *W. semicordata*, but confusion has persisted. For example, the plant captioned as *W. martinezii* in Olsen (2007) is misidentified. I have seen plants in several Scottish gardens, including Royal Botanic Garden Edinburgh's Benmore and Logan gardens, labelled as *W. martinezii*; they are all *W. semicordata*.

Woodwardia semicordata is another handsome fern (Fig. 15), with fronds resembling those of *W. spinulosa* but the sori towards the frond apex occur adjacent to the major veins, as in *W. martinezii*. The rhizome resembles that of *W. martinezi*i and is prostrate and creeping. Therefore it is easily divided, which may explain its relative frequency in gardens. As yet it is unclear whether sterile, fertile or both forms are in cultivation.

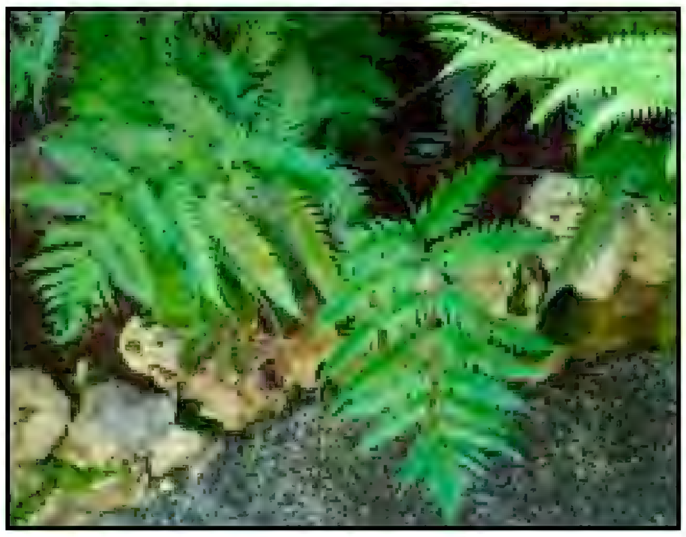

Fig. 15. *Woodwardia semicordata* mislabelled as *W. martinezi*i, Benmore Botanic Garden

Woodwardia areolata

This species differs substantially from other *Woodwardia*. The rhizome is slender, horizontal and creeping, forming colonies. The fronds are deciduous, thin-textured and pinnatifid, with the fertile ones being contracted and skeletonized. New growth is quite colourful (Fig. 16).

Although naturally a marsh or bog plant and preferring constant moisture,

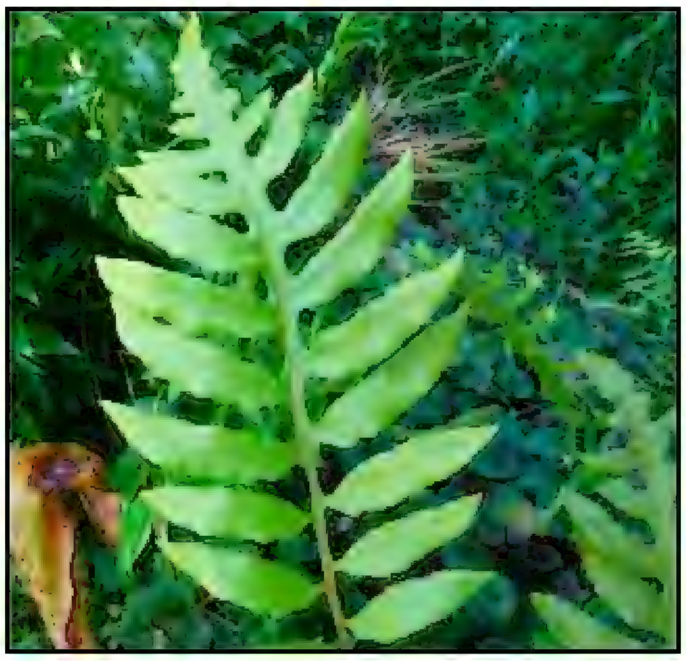

Fig. 16. *Woodwardia areolata*, sterile frond

it will grow under normal garden conditions although stature is reduced and growth is less vigorous. It originates from eastern North America, ranging from southeast Canada south to the Gulf of Mexico. It is probably the most cold-hardy species. It appears to be rarely cultivated in the UK but is attractive and deserves to be better known.

Woodwardia virginica

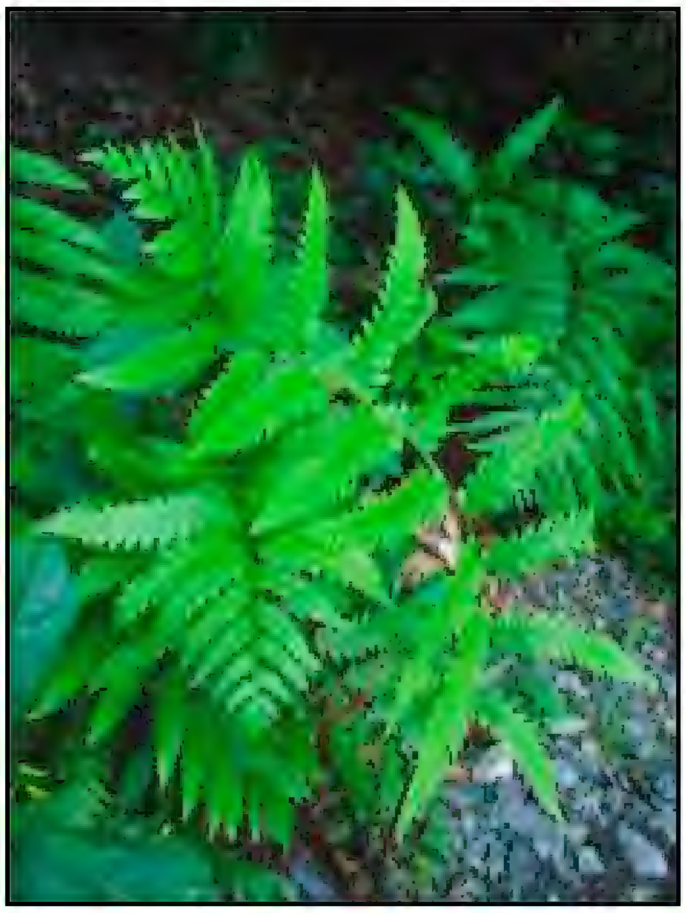

Fig. 17. *Woodwardia virginica*

Another deciduous species from eastern North America, in this the fertile fronds resemble the sterile ones; they are fully pinnate and briefly coloured on unfurling. The rhizomes are horizontal and very robust and strong-growing Figs. 17 and 18).

I have found this species difficult to keep alive as it is a true aquatic fern. Young plants grow quite well in moist garden soil but mostly die over winter. I suspect that the rhizomes are tender and deep water protects them from severe frost. If ideal conditions are available it should be an attractive plant for a large bog garden. I have not yet seen *W. virginica* established in a UK garden although it is occasionally offered by fern suppliers.

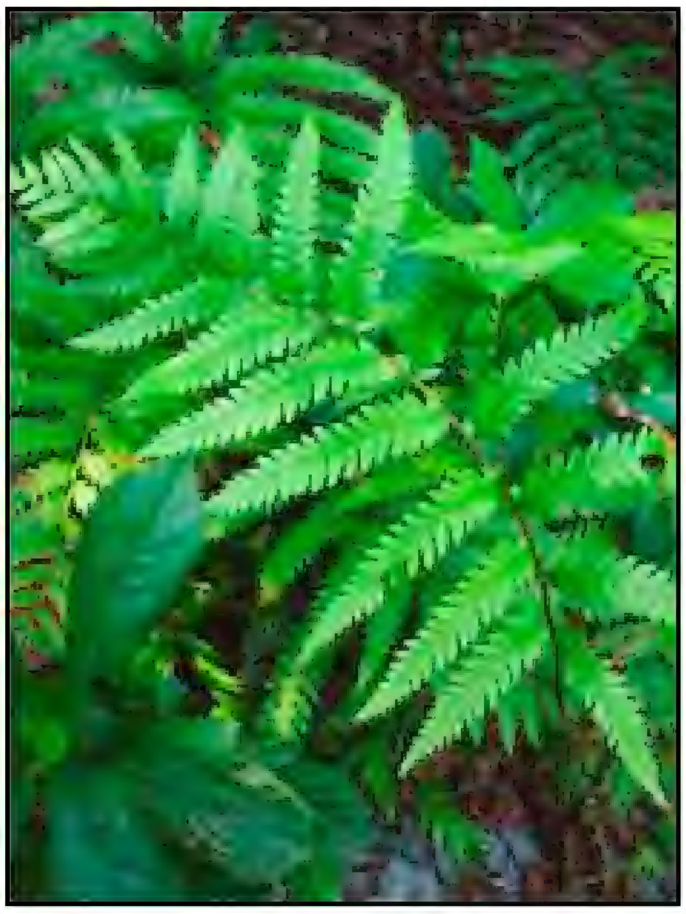

Fig. 18. *Woodwardia virginica*

Cultivation

In the wild chain ferns are found most frequently in areas of high rainfall and humidity with relatively mild winters. Soil should ideally be acidic to neutral. Continuous moisture is beneficial, although most species are tolerant of limited dry periods. *Woodwardia virginica* and, to a lesser extent *W. areolata*, are from marshy habitats and require permanent moisture for successful establishment. For terrestrial species a site sheltered from strong or cold winds is preferable.

For the Old World species, a raised position or bank from where the heavy fronds can hang down is ideal. If space is available magnificent colonies can develop. If planted in a border the fronds tend to flop. The New World species related to *W. fimbriata* have more upright fronds and are better suited to confined spaces.

Propagation

Propagation of the bulbiferous species, *W. prolifera*, *W. radicans* and *W. unigemmata*, can easily be done by pegging down fronds and allowing the bulbils or plantlets to root before severing them from the frond. The bulbils or plantlets can also be removed and rooted separately but require high humidity for success.

Woodwardia areolata, *W. semicordata* and *W. virginica* possess creeping rhizomes and these can be easily divided.

All species can be grown from spores and most seem to be relatively easy to raise by this method.

Conclusion

I hope this article will help gardeners establish the identities of chain ferns in their gardens and encourage more to be grown.

Confirmation that *W. spinulosa* is still in cultivation would be welcome, as would information on *W. harlandii*, *W. kempii* and *W. martinezii*, the three other temperate species that may demonstrate cold hardiness.

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Polypodium cambricum ‘Omnilacerum Burntbarrow’

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This new fern variety was found in the wild by Lynne Farrell in 2017. She is well known amongst the professional botanists of the BPS, having been one herself. Recently retired, she moved from Cambridgshire to Arnside, Cumbria, because it was nearer to the Isle of Mull in Scotland where she is the recorder for the Botanical Society of Britain and Ireland (BSBI).

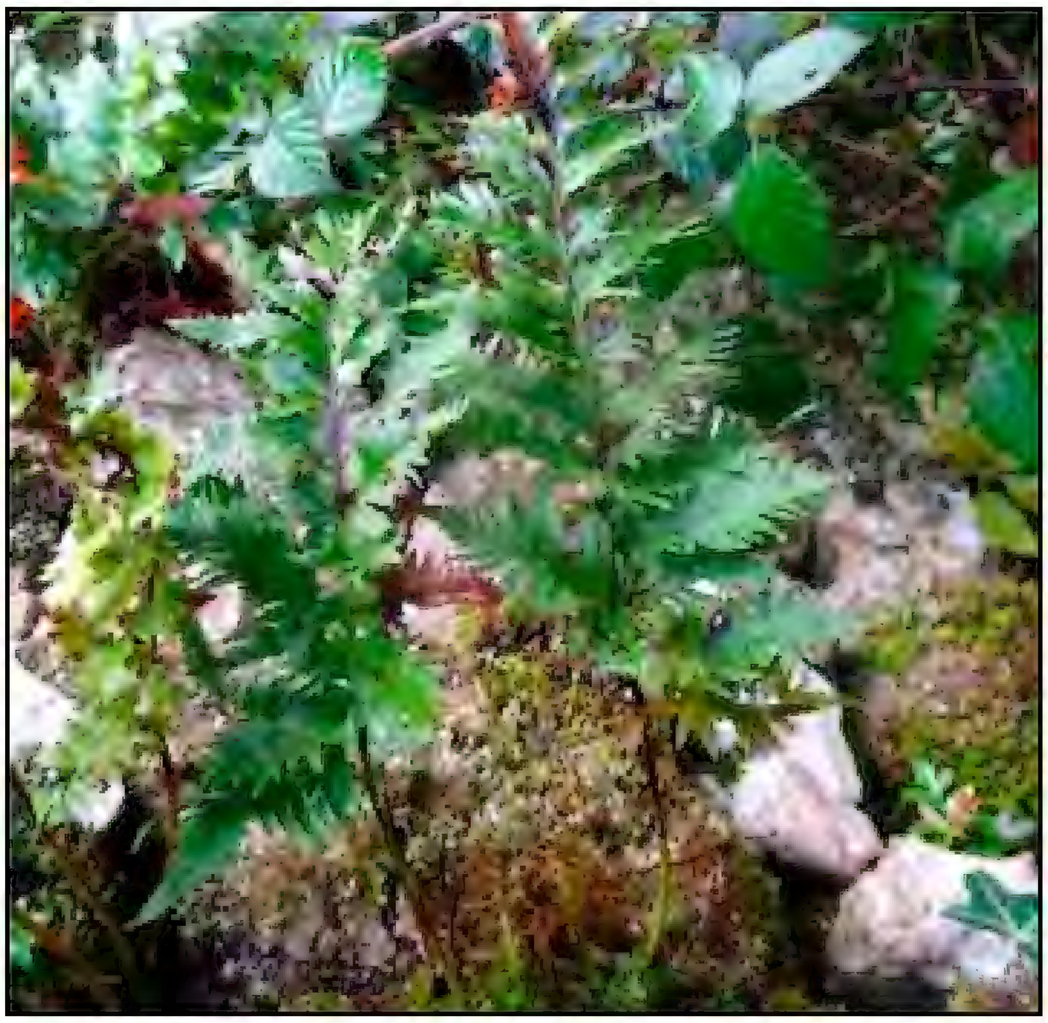
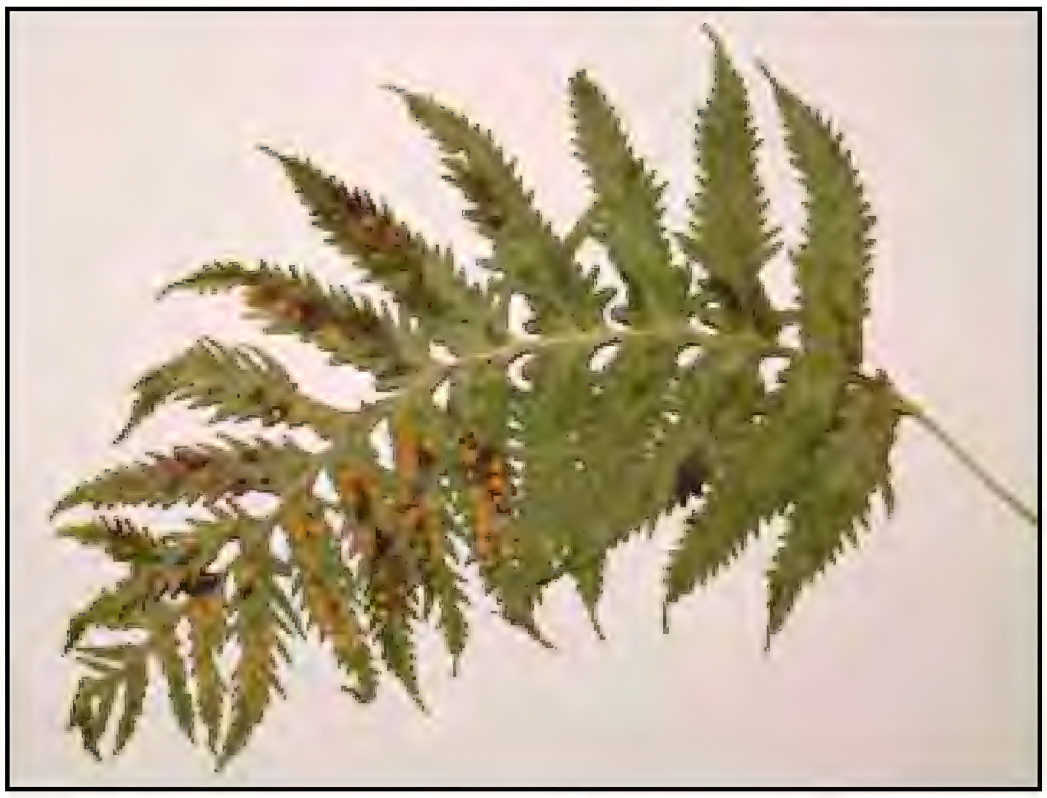


Fig. 1. *Polypodium cambricum* ‘Omnilacerum Burntbarrow’ in situ between Milnthorpe and Arnside, Cumbria



Frond detail
Photo: J. Roberts

She contacted Jeremy Roberts, one of the three recorders for the Vice County of Cumberland and Westmorland. He examined the sporangia and confirmed that it was a *Polypodium cambricum* form.

He supplied these amazing pictures of the sporangium and in Fig. 4 is a nice image of paraphyses, typical of *P. cambricum* and absent from the other species and hybrids in the UK. The sporangia were not fully ripe in November which is also very typical.

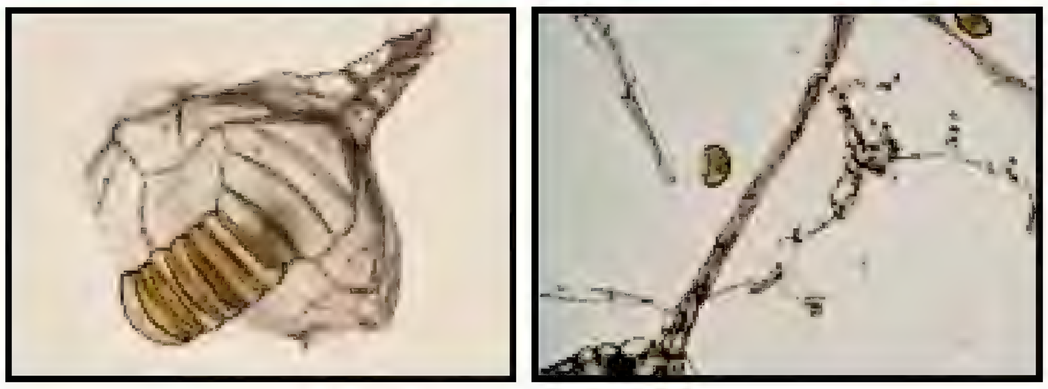


Fig. 3. Details of the sporangia
Photo: J. Roberts

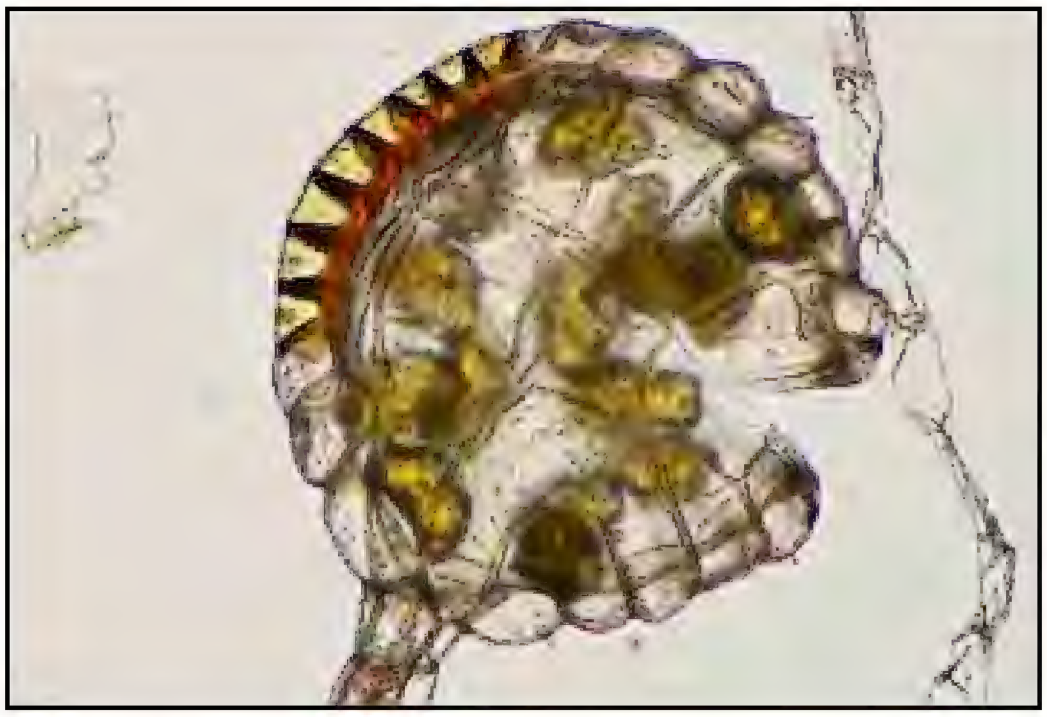


Fig. 4. Detail of the sporangia showing paraphyses
Photo: J. Roberts

It was found between Milnthorpe and Arnside, Cumbria, which coincides with the area where *P. cambricum* ‘Omnilacerum Aldrenii’ was found by J. A. Aldren in 1873.

However, it is not the same, as you can see in Fig. 5 (left). ‘Omnilicarum Aldrenii’ does not have the evenness of habit of the new find and when you replant a lot of semilacerums and omnilacerums they have a habit of reverting to the normal form till they settle down again. P. cambricum ‘Omnilacerum Bennett’ was notorious for not getting into character as was ‘Omnilacerum Aldrenii’, while so far ‘Burntbarrow’ has not had this fault and we are looking forward to it developing more this year. Where it was found it was not massive but the Semilacerum and Omnilacerrum types are the largest growing of the *Polypodium cambricum* cultivars and it will be interesting to see how it develops.

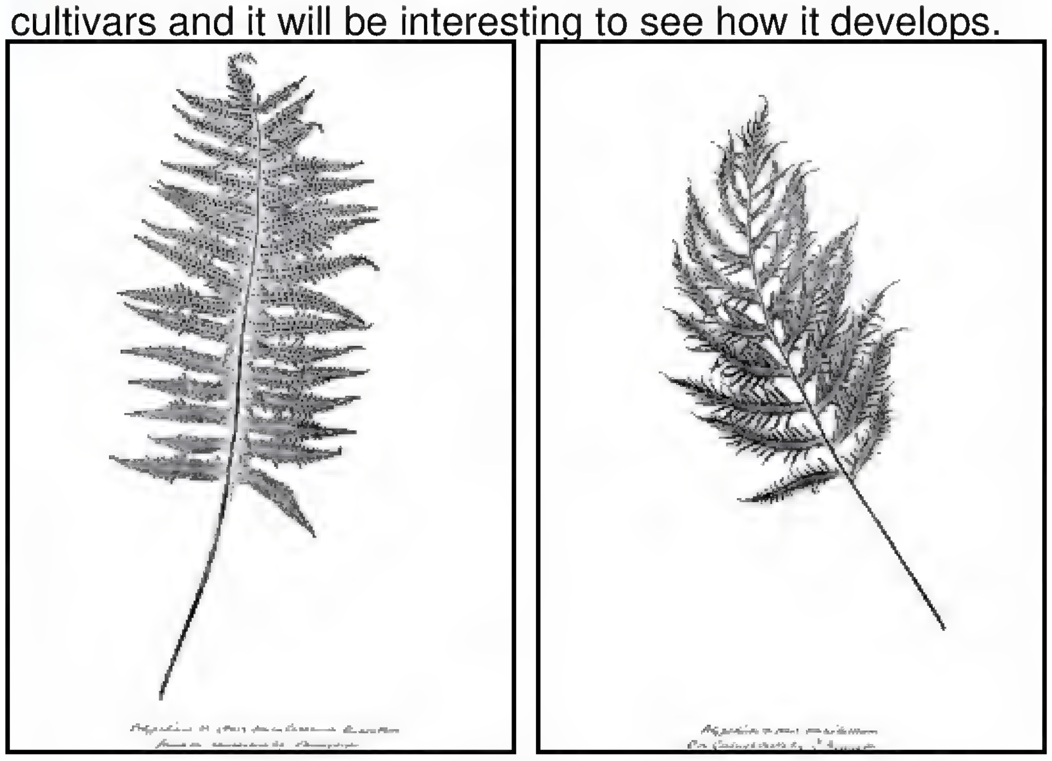


Fig. 5. Left: *Polypodium Cambricum* ‘Omnilacerrum Aldrenii’
Right: *Polypodium Cambricum* ‘Omnilacerum Bennett’
(Taken from Jones’ Nature Prints)

Polypodium cambricum ‘Omnilacerum Burntbarrow’

After a lot of email communications, Alec Greening, the editor, met up with Lynne Farell and they visited the fern in order to take pictures and a small division.

Then at Christmas time Tim Godfrey a B.P.S. member from the Isle of Skye sent in a picture of the same plant, what a coincidence!

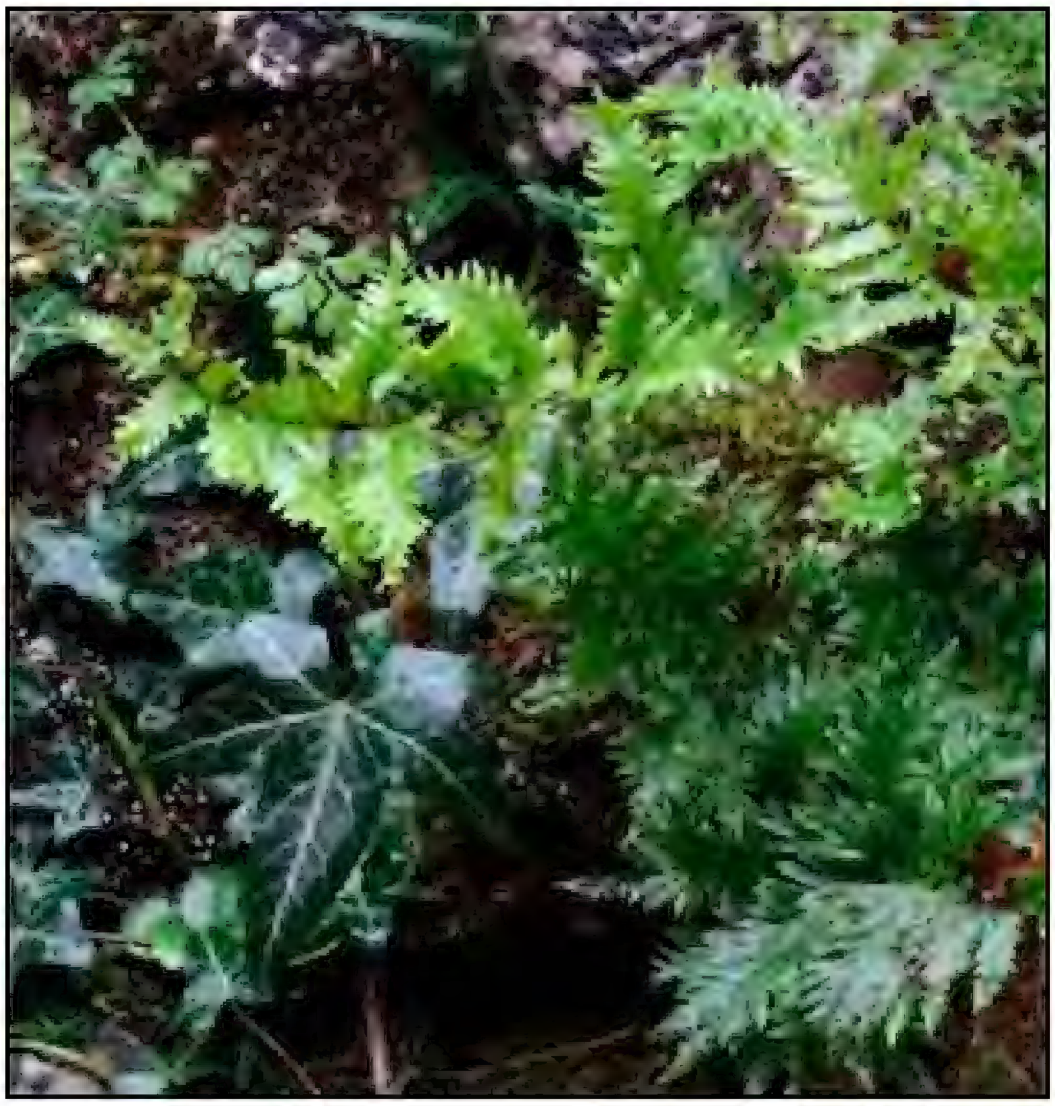


Fig. 6. ‘Omnilacerum Burntbarrow’ taken in Dcember by Tim Godfrey.

When Steve Coleman and I visited Alec at the end of January he gave the division to me in order to grow it on and we had the privilege of meeting Lynne, seeing the site and next day going to Warton Crag to look for *Polypodium cambricum*.We had a fascinating day in her company and also found a very interesting *Polystichum*.

Fig. 7. Steve Coleman and Lynne Farrell in a dell on Warton Crag after a day looking for *Polypodium Cambricum*

When I went to pot up the Polypodium it broke into 2 pieces and these are being grown on by me and a friend. Since then it has developed well and I have 2 small ferns here and my friend has got prothalli from it, so who knows what may come out of this new gene pool. As for the division, in the next couple of years we will be able to spread it around the society to make sure it does not have the same fate as P. cambricum ‘Omnilacerum Bennet’ seems to have done.

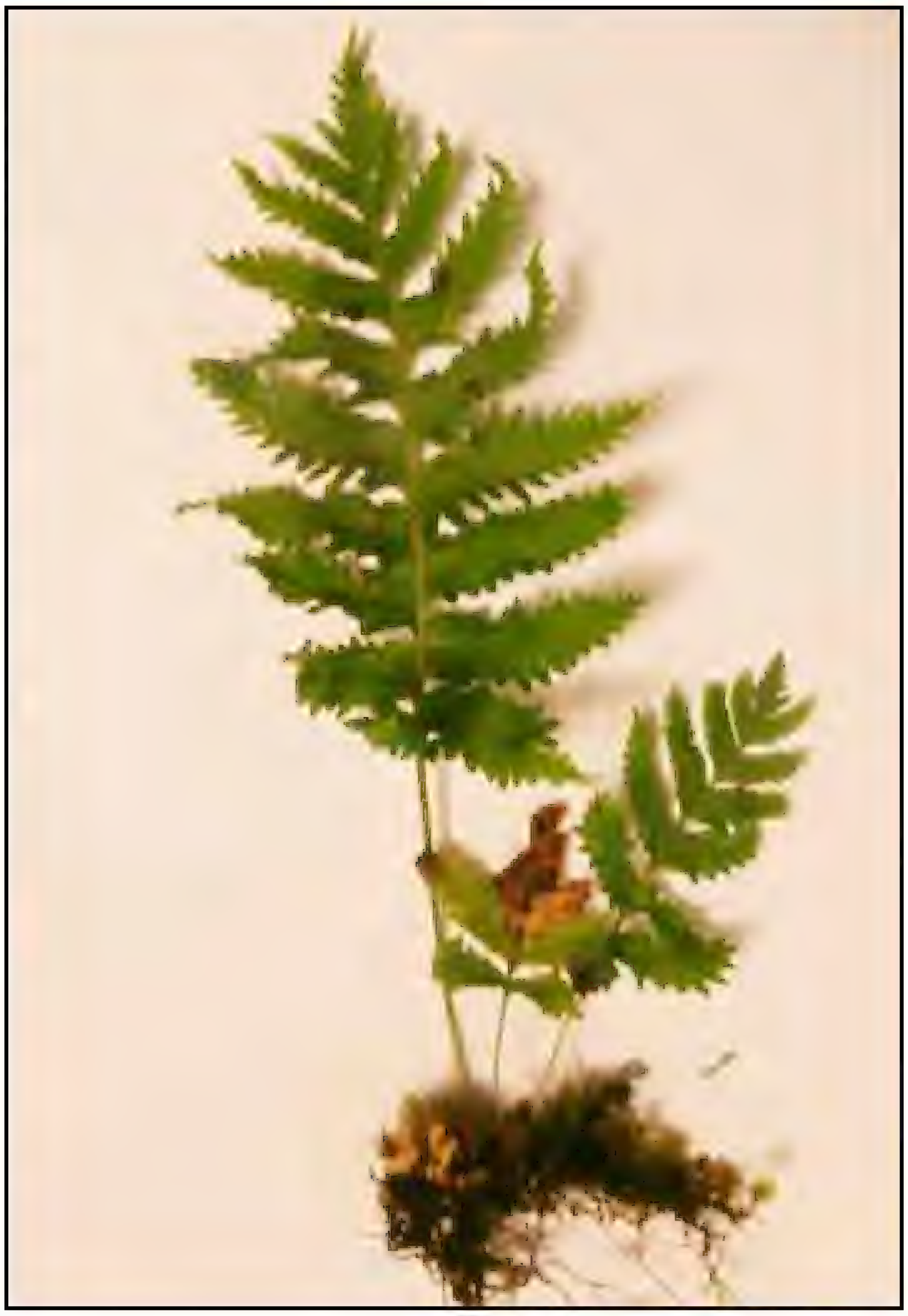


Fig. 8.The small division taken from the parent plant showing frond detail that broke into two pieces when potted up

It just brings home Steve Coleman’s comment that it is another variety preserved for the the future or as other gardeners say, if you give a plant away you never lose it.

And finally, congratulations to Lynne for being President elect for the BSBI. She has a remarkable background being a professional botanist and a deep knowledge of plants as you will often find with BSBI recorders. Their depth of knowledge is phenomenal

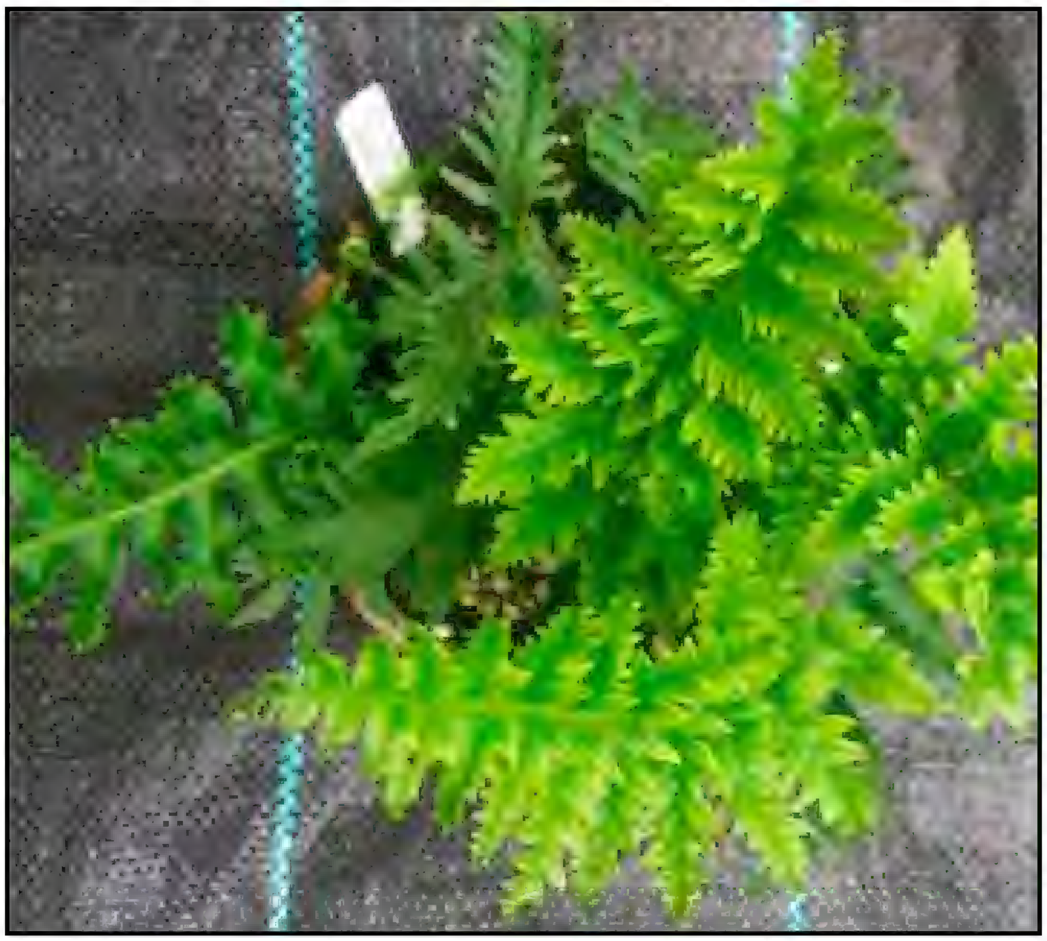
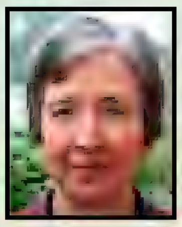


Fig. 9. A recent photo of *Polypodium Cambricum* ‘Omnilacerum Burntbarrow’ showing it’s progression

Help us to improve our knowledge of fern hardiness



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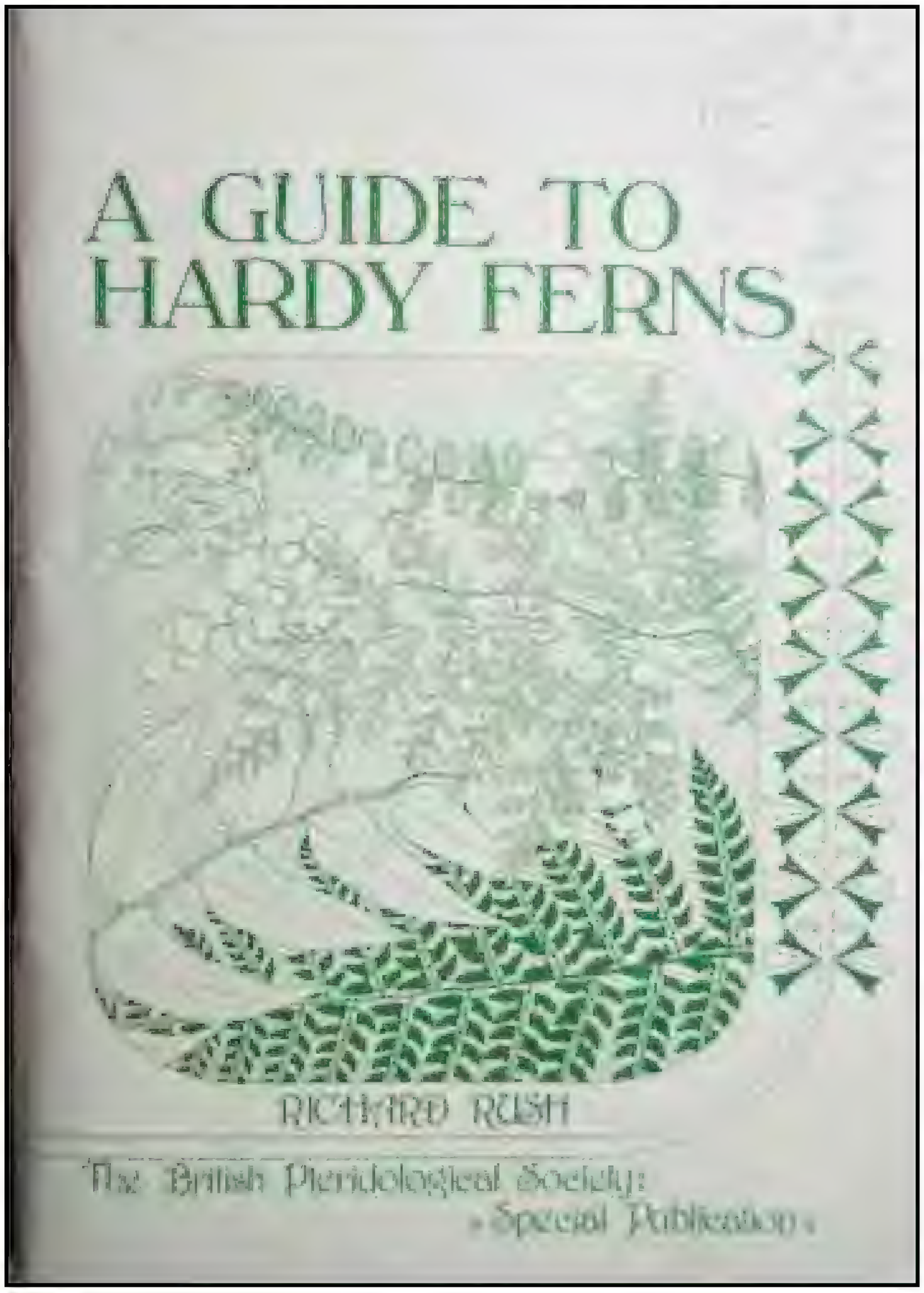
The first BPS Special Publication in 1984 was Richard Rush's 'A Guide lo Hardy Ferns' (Fig.1). Now long out of print, second-hand copies are rapidly snapped up when they appear in BPS Book Sales. Richard wanted a companion to spore lists to tell him which ferns were likely to be hardy, and as there didn't seem to be such a volume at the time, he decided to write his own. It is a mine of useful information, covering ferns from around the world. In many cases hardiness was rated as 'probably', 'possibly', or 'perhaps'. He drew on his own experience, that of other fern growers, and a wide selection of fern literature. He recognised that many factors other than temperature played a part in the survival or otherwise of garden ferns. He encouraged people to try new ferns outside, and said 'I would like to learn of your findings in trying out species not yet generally known and grown as hardy.' As far as we know, nothing further was published relating to these findings.



A GUIDE TO
HARDY FERNS

RICHARD RUSH

The British Pteridological Society:
Special Publication

Fig. 1. Special Publication No. 1.

In our Spring meeting in April 2018, John David of RHS Wisley gave a talk on the issue of fern hardiness, exploring the difficulty of defining the term and the problems with hardiness scales. Growing season is longer in the south than the north, and rainfall declines as one moves from West to East, but local microclimates can make a big difference. John felt that there are probably many more ferns that would be hardy in British gardens than are currently grown, and that information from BPS members' gardens would be very useful in increasing our knowledge of what can be grown. This inspired Julian Reed to suggest that we should design a project to collect information from members about what ferns of uncertain hardiness have and have not survived with them. Just this information related to location of the garden would be useful, but extra information on the climatic conditions and situation of the ferns within the gardens would be even more helpful. With this in mind we have designed a fairly simple and short questionnaire, and would be very grateful if our UK and Irish gardening members could try this out for us. In future years we hope to use a refined questionnaire to assess survival through the previous winter, to be completed as near as possible to the beginning of July, when we will know the outcome for the vast majority of our ferns. The form will be available on our website, or request paper forms from Julian if you are not able to photocopy the form given on the next page.

USDA fern hardiness zones are available in Martin Rickard's book, Gardening with Ferns, and in Sue Olsen's Encyclopedia of Garden Ferns. You can also find more detailed maps online, using 'USDA hardiness zones' as the search term. Briefly, most UK and Eire coastal zones are zone 9 (-7 to -1 degrees C), inland areas are mostly zone 8 (-12 to -7 degrees C), and parts of the highlands of Scotland are zone 7 (-18 to -12 degrees C). We have used the USDA zones as we are most familiar with these; the lowest numbers indicate the lowest temperatures. These are still broad generalisations, and temperatures in all zones can obviously vary enormously from winter to winter.

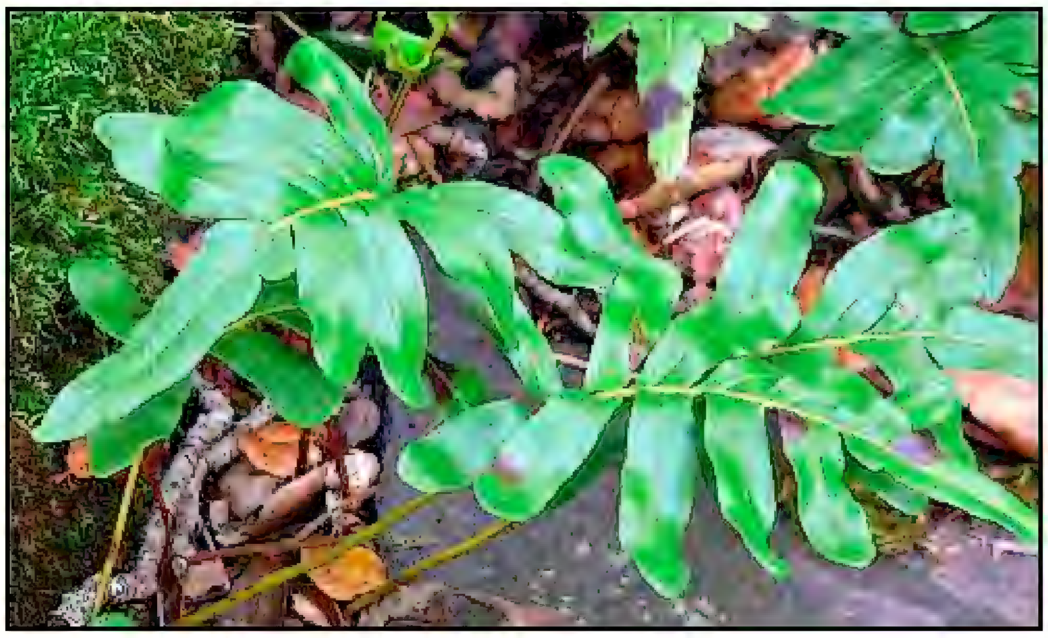


Fig. 2. *Polypodium scouleri,* one of the ferns of interest

To help people to focus on ferns where hardiness is in doubt, we also include a list of ferns we would like to know about. Don't worry if you have never heard of some of these! If there are ferns that have surprised you, either by surviving severe frost, or dying when conditions seemed good, we would like to hear about those too. Please send completed forms to Julian Reed, 19a Northdown Road, Kemsing, Sevenoaks, Kent, TN15 6SD. Thank you very much!

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Rickard, M. 2005. *Gardening with Ferns.* David and Charles.

Rush, R. 1984. *A Guide to Hardy Ferns*. B.P.S. Special Publication 1.

Fern Hardiness Questionnaire

In his book 'A Guide to Hardy Ferns' (BPS Special Publication No. 1), which appeared in 1984, Richard Rush made the point that there was still much to learn about the hardiness of many ferns. You can help us to improve our knowledge by completing this questionnaire for ferns that you grow outside in the UK or Eire.

We would like to know about ferns that died, and ferns that surprised you because they survived, as well as those that seem reliably hardy with you. We are particularly interested in the ferns on the list below, but if you think we should include any others, please let us know. Please tick the relevant boxes, and fill in free text where indicated. Please complete a separate form for each fern you report on. Thank you!

About your garden:

Postcode (or OS grid reference): ……………………

USDA hardiness zone, if known: …………………… Annual rainfall, if known ………..

About the fern:

Name of fern ……………………………………………………

Died ☐ Reduced ☐ Survived well ☐

How long has the fern been in your garden?

1 year or less ☐ 2 years ☐ 3 years ☐ 4 years or more ☐

The situation of the fern in your garden:

In the ground ☐ In a pot ☐ In a raised bed or trough ☐

Aspect: facing North ☐ East ☐ South ☐ West ☐

Under trees or bushes? Yes ☐ No ☐

By a wall? Yes ☐ No ☐

Any other wind or rain protection? Yes ☐ please specify:
No ☐

For ferns in the ground, is the area - Always moist ☐ Dryish ☐ In between ☐

Thinking of last winter (2018 / 2019):

Minimum temperature, if known: ………… Degrees C

How many days of frost in total, approximately? …………………. days

How many days of snow cover in total, approximately? ……………….. days

Thinking of last Summer (2018):

How many consecutive days without rain, approximately? ……………days

Did you water this fern? No ☐ Yes, occasionally ☐
Yes – frequently ☐

Please tell us why you think this fern either died or survived:

Thank you!

Your name:

Email address:

Phone number:

Date of completion of this questionnaire:

Ferns we are interested in:

Adiantum x *mairisii* (*mariesii*)
Arachniodes davalliaeformis and other *Arachniodes*
Araiostegia perdurans
Blechnum fluviatile (*Cranfillia fluviatilis*)
Cheilanthes species
Dicksonia antarctica
Diplazium wichurae
Drynaria sinica
Lophosoria quadripinnata
Leucostegia immersa
Pleopeltis gutata (used to be *Polypodium gutatum*)
Polypodium scouleri - shiny form
Polypodium scouleri – matt-leafed form
Pyrrosia species
Rumorha adiantiformis
Woodwardia unigemmata

The photographic competition 2019. How it was judged.

In establishing the annual photographic competition, it was hoped that the opportunity to take and submit photos to be viewed by other Society members would increase awareness of the beauty and diversity of ferns, fern allies and fern-decorated artefacts. Over the last few years the photo competition has been a great source of attractive images of wild and cultivated ferns, as well as of decorated jugs, furniture and glass. These images have been published in the Pteridologist and on the BPS calendar, an excellent piece of BPS merchandise for any Society member.

This year the competition at the AGM at Harlow Carr attracted more entries than in previous years and was well-visited, with most of the attendees voting. In the three classes the subjects of the photos varied widely, from an emerging frond of *Cyathea crinita* in Sri Lanka to colourful equisetum sori and a forearm tattoo sported by a young gardener in the Tropical Ravine in Belfast Botanic Garden (which is well worth a visit). The wining photos stood out not only for their subject matter but also for the skill in set-up and lighting and the attention paid to the background, which some of us fail to see when focusing on the object of interest!

Paul Sharpe from Edinburgh again showed his skill in photographing the beautiful detail of fronds and sori and Sue Olsen submitted an excellent photo of a piece of fern-decorated pottery. She has an eagle-eye for such artefacts. It was no easy matter for voters to choose a winner as all the submissions were good. However, votes were counted, winners were picked, prizes were given, and we look forward to next year's competition! In the meantime we will have the chance to see the winning entries in the Pteridologist and a selection from all the entries on the 2021 calendar, available early next year.

Peter Blake

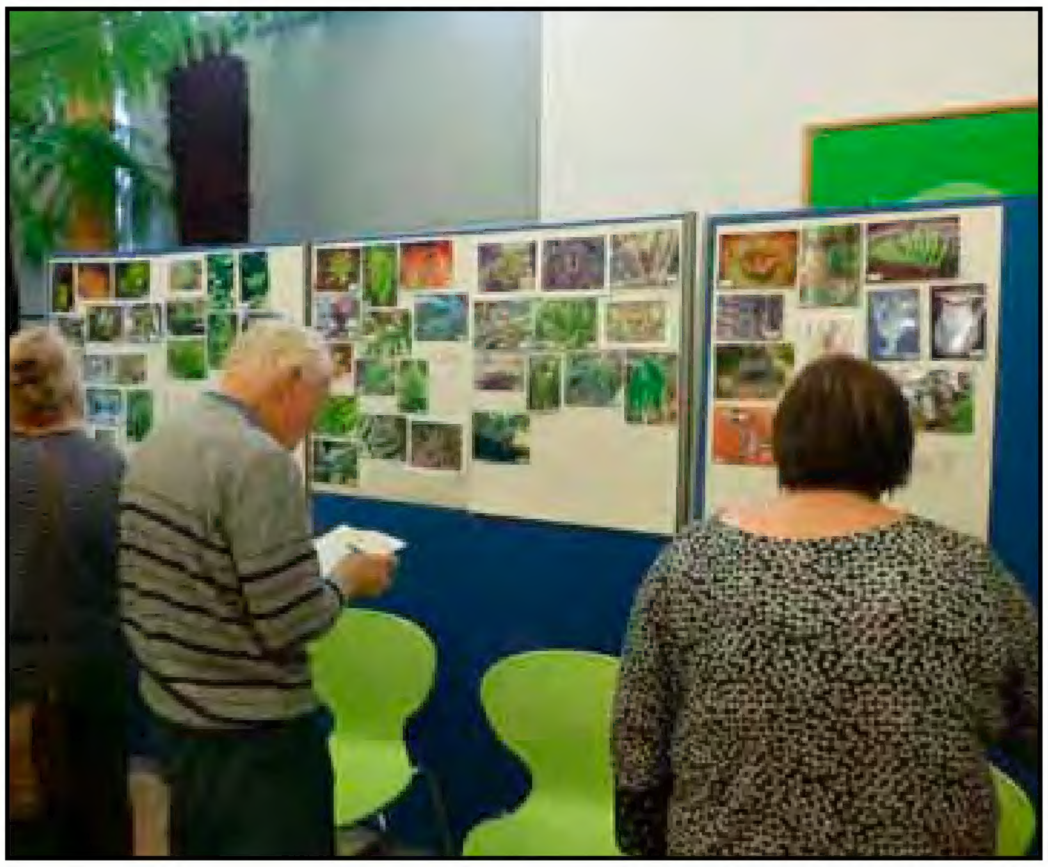


Fig.1. Members judging the entries

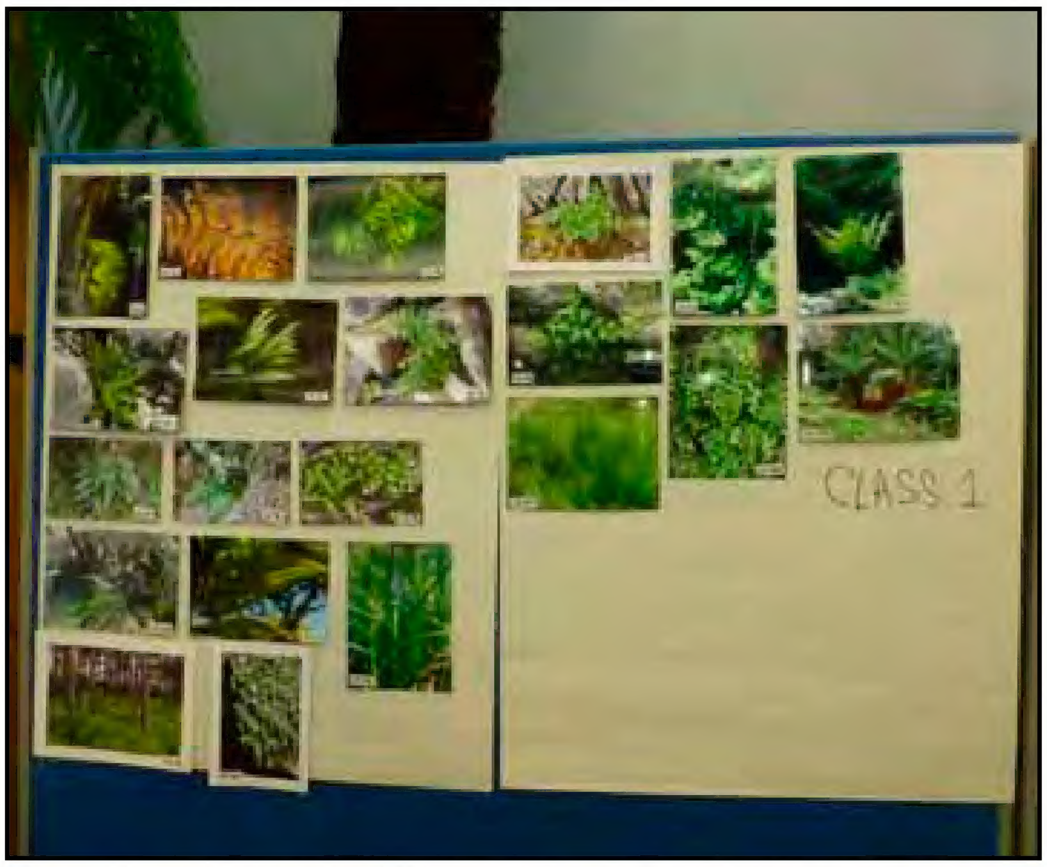


Fig. 2. The entries for Class 1, ferns in a natural landscape

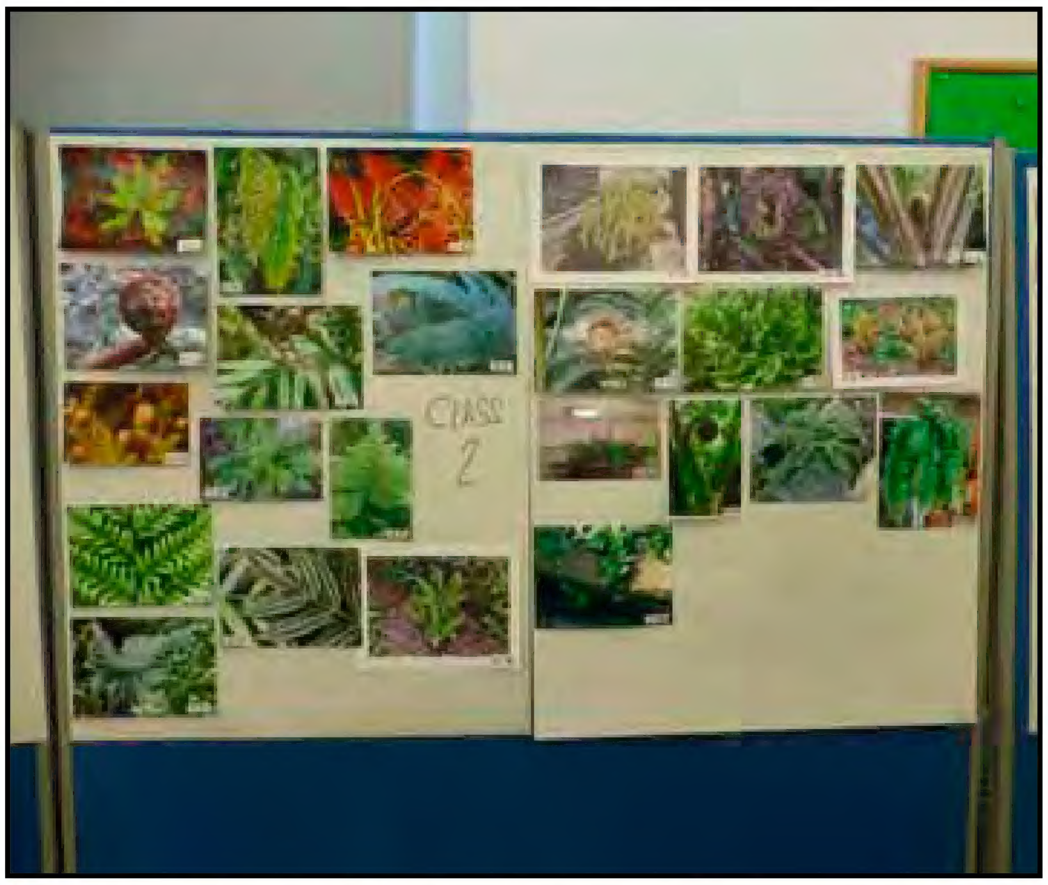


Fig. 3. The entries for Class 2, cultivated ferns in a house, greenhouse or garden

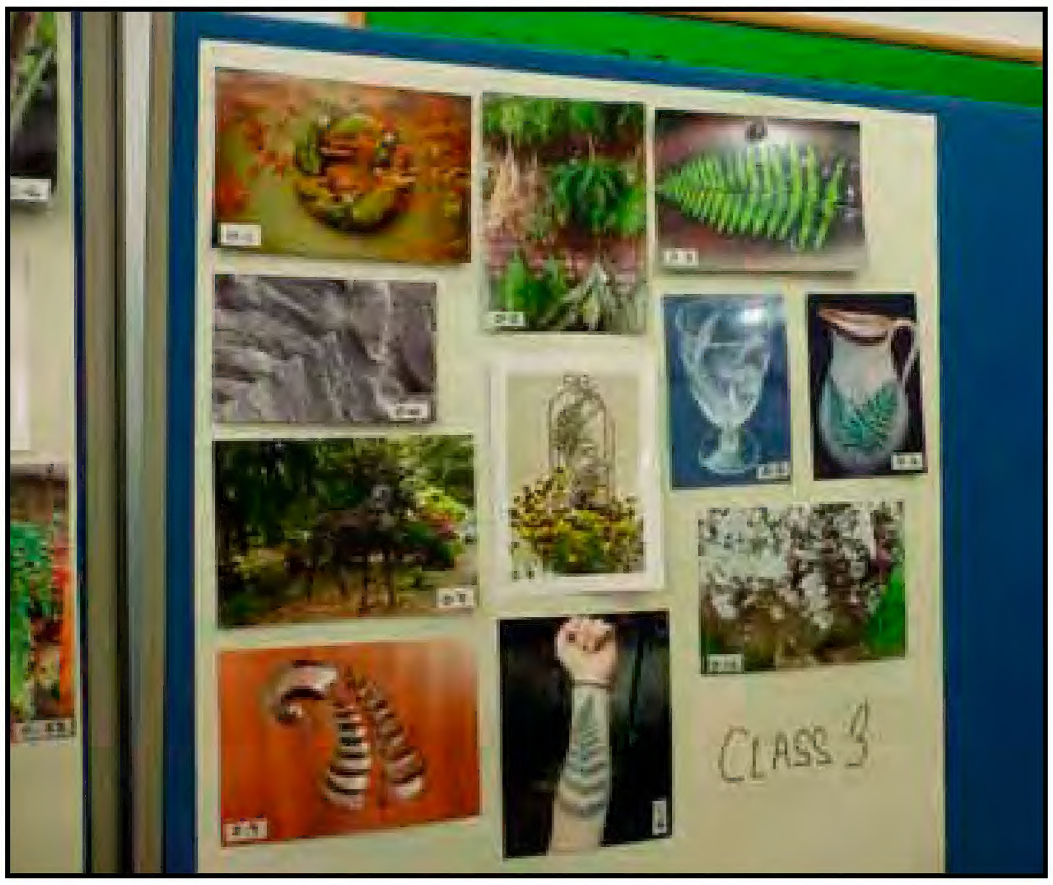


Fig. 4. The entries for Class 3, item or object with a fern related theme

The BPS Photographic Competition 2019

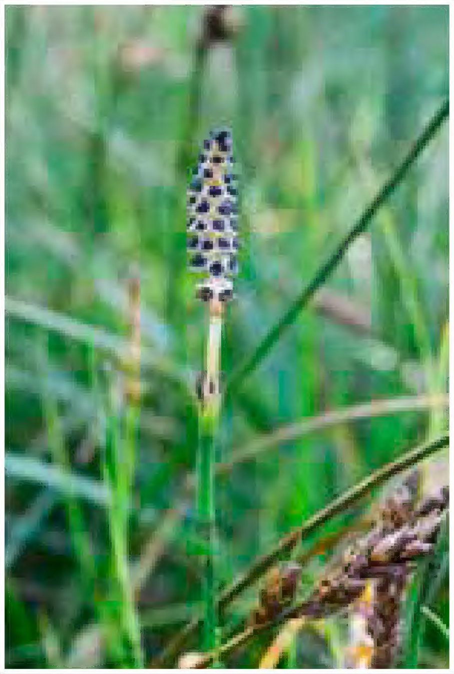
The annual BPS Photographic Competition was started in 2014 with the aim of encouraging members to take good photos of ferns and fern-related items, and share these with other members. The Competition also provides photographs for the BPS Calendar, and prizes are awarded for the best entries. This year, the sixth year of the Competition, the rules were changed somewhat. The maximum size of prints was increased from 6 inch x 4 inch (15 cm x 10 cm) to 7 inch x 5 inch (18 cm x 13 cm), digital copies were accepted by email (but retaining CDs etc as an option) and at the AGM, each voter was allowed 2 votes per class rather than just one. There were some really good entries with 56 photographs submitted by 10 members. Class 1 – Ferns in the Wild and Class 2 – Cultivated Ferns continued to be the most popular with 21 and 24 submissions respectively. The harder category, Class 3 – Fern-related items, attracted 11 entries.

Thirty people voted at the AGM day at Harlow Carr on 13 April 2019 and as can be seen from the attached photographs, they are all of a very high standard. Class 1 was won by Paul Sharp with Alison Evans the runner-up. Class 2 was also won by Paul with another of his photos the runner-up. Class 3 was won jointly by Patricia Howard and Sue Olsen, with myself the runner-up. Not unsurprisingly, and very deservedly, Paul also won the best photographer prize for the highest total number of votes - another rule change from previous years when the best photograph used to win. Congratulations to the prize winners and commiserations to the other entrants (though your photos may still appear in the BPS Calendar!).

Finally, as well as thanking people for entering, my special thanks goes to Peter Blake and Chris Evans who looked after the competition at Harlow Carr. Due to last-minute unforeseen circumstances, I wasn't able to attend the meeting, and had they not have stepped in, the competition would have been in vain. I'm also grateful to Ruth Piearce for taking the attached photos during the voting.

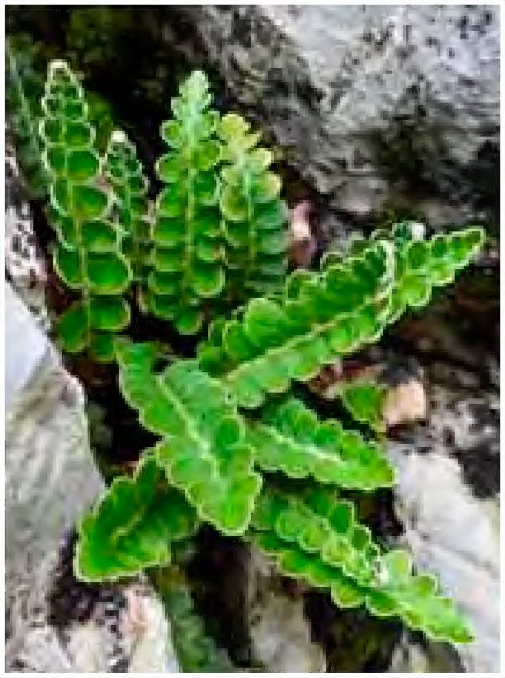
Bryan Smith

Class 1 - Ferns in a natural landscape

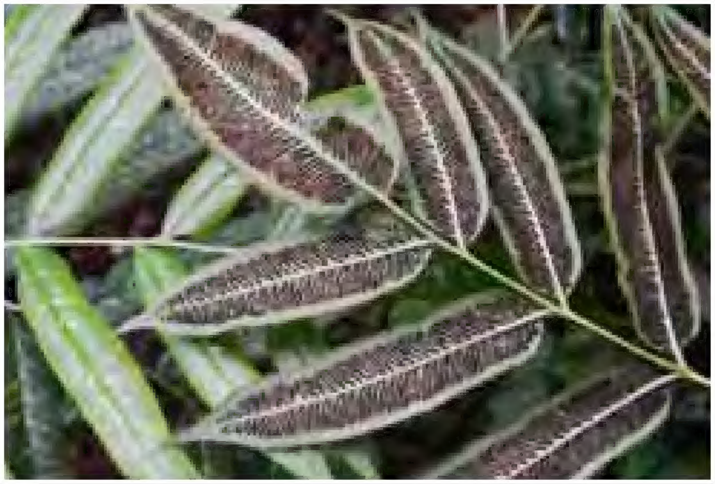


1st ←
Paul Sharp - *Equisetum palustre*. Hunter's Bog, Edinburgh, Scotland

2nd →
Alison Evans – *Asplenium ceterach,* Apuan Alps, Italy

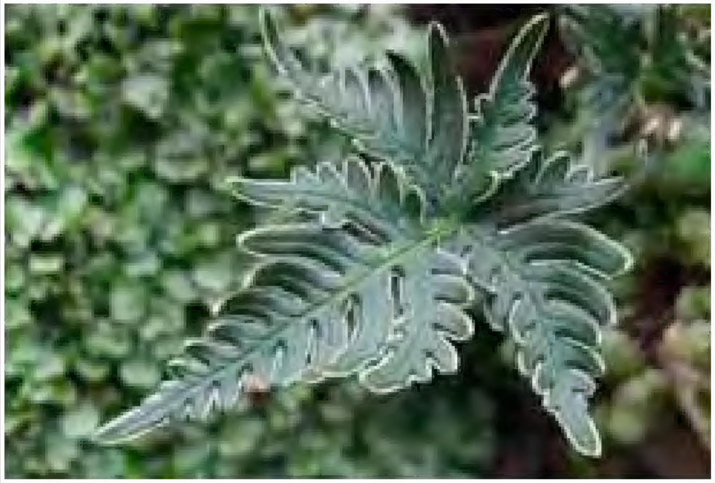


Class 2 - Cultivated ferns in a house, greenhouse or garden

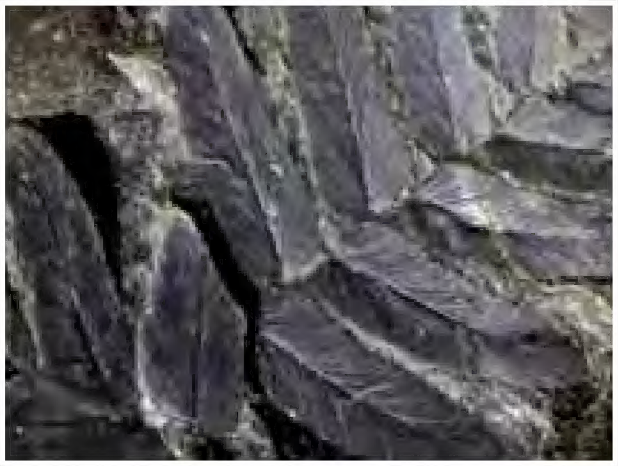


1st ←
Paul Sharp - *Coniogramme intermedia*. Royal Botanic Garden Edinburgh, Scotland

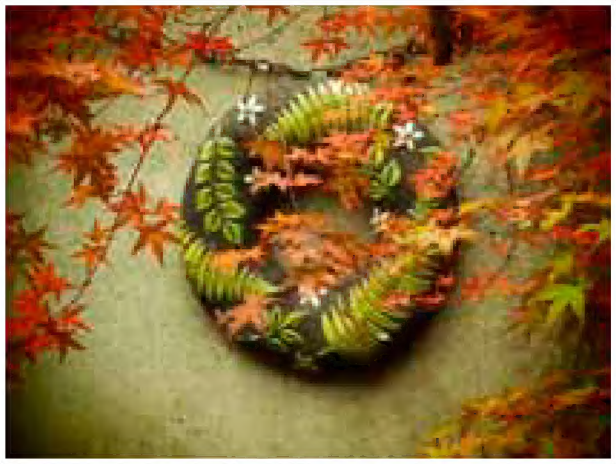
2nd →
Paul Sharp - *Cheilanthes argentea*. Royal Botanic Garden Edinburgh, Scotland



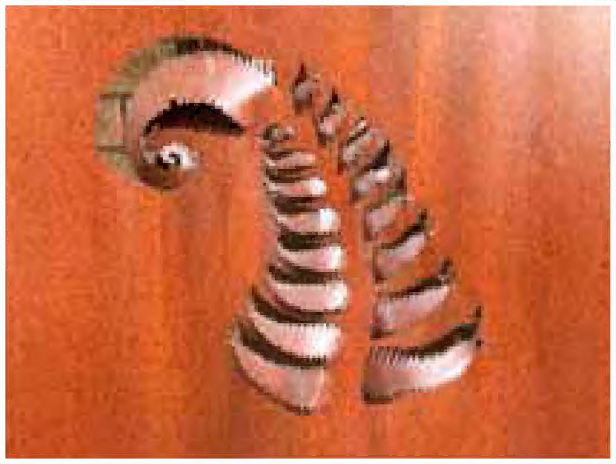
Class 3 - Item or object with a fern-related theme



=1st: Patricia Howard - Fossil fern, Cornwall



=1st: Sue Olsen - Ceramic wreath in Sue Olsen's garden, Washington, USA



2nd: Bryan Smith- Metal fern wall detail, Gill & Bryan Smith's garden, Oulton Broad

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The **BRITISH PTERIDOLOGICAL SOCIETY** was founded in 1891 and is still a focus for fern enthusiasts, its wide membership including gardeners, nurserymen and botanists, both amateur and professional. It provides a wide range of information about ferns through its publications and website, and also organises indoor and field meetings, garden visits, a plant exchange, a spore exchange and fern book sales. The Society's journals, *The Fern Gazette*, *Pteridologist* and *Bulletin* are published annually. *The Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist*, topics of more general appeal, and the *Bulletin* deals with Society business and meetings reports. **Website: www.eBPS.org.uk**

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